NT31/631 Multi-Vendor Connection

Operation Manual

Revised February 2001

OMRON Product References

All OMRON products are capitalized in this manual.

Names of Devices and Tools

PT Refers to OMRON NT series programmable terminals.

NTST Refers to OMRON NT-series Support Tool.

PLC Refers to an Allen Bradley SLC 500/PLC 5/MicroLogix series, GE-Fanuc 90-30 series, Siemens S7-300/400 series, Modicon TSX Micro/Premium/Quantum programmable controller.

System installer Refers to an OMRON NT-series system installer.

PT Type	Model	Applicable PLC	Personal Computer
NT31/NT31C (-V□)	Attached to the support tool (*1)	Allen Bradley SLC 500 /PLC5 /MicroLogix series GE-Fanuc 90-30 series Siemens S7-300/400 series Modicon TSX Micro/Premium/Quantum series.	For IBM PC/AT compatibles
NT631/NT631C (-V□)	Attached to the support tool (*1)	Allen Bradley SLC 500 /PLC 5/MicroLogix series. GE-Fanuc 90-30 series Siemens S7-300/400 series Modicon TSX Micro/Premium/Quantum series	For IBM PC/AT compatibles

(*1) System program for NT31/NT31C and NT631/NT631C is attached to "NT-series Support Tool for Windows (Ver. 4.2)".

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Related Manuals and Their Contents:

The related manuals are indicated below.

The □ symbol at the end of the manual number is the revision history symbol.

[Connections between the programmable terminal (PT) and programmable controller (PLC), etc.]

- PC Connection, Operation Manual ..... V042-E1-□

This Operation manual describes how to connect the programmable terminal (PT) to programmable controllers (PLC) and other equipment, and how to make the setting required for these connections.

[For information on NT-series PT functions, operations, and restrictions]

- NT31/31C Programmable Terminal Setup Manual..... V062-E1-□
- NT631/631C Programmable Terminal Setup Manual ..... V063-E1-□
- NT31/31C,NT631/631C Programmable Terminal Reference Manual..... V064-E1-□

These manuals contain full descriptions of NT series PT functions, operations, and restrictions.

- NT-series Support Tool for Windows (Ver. 4.1) Operation Manual.....V061-E1-□

The screens displayed in the PT are created and transferred with the Support Tool. This manual describes how to create and transfer the screen data. It describes also how to use the system installer for installing the system program to the PT.

How to Use the Manual

This Operation Manual comprises the following Sections.

SECTION 1 Connectable Hardware Combinations

This section provides an overview of system requirements necessary to use NT31/631 with Allen-Bradley, GE Fanuc, Siemens, or Modicon PLCs.

SECTION 2 Using NTST with Allen-Bradley, GE Fanuc, or Siemens PLCs

This section describes how to configure NTST for use with Allen-Bradley, GE Fanuc, Siemens, or Modicon PLCs.

SECTION 3 Use with Allen-Bradley PLCs

This section describes specific hardware configuration requirements and equipment necessary to connect NT31/631 to compatible Allen-Bradley PLCs.

SECTION 4 Use with GE Fanuc PLCs

This section describes specific hardware configuration requirements and equipment necessary to connect NT31/631 to compatible GE Fanuc PLCs.

SECTION 5 Use with Siemens PLCs

This section describes specific hardware configuration requirements and equipment necessary to connect NT31/631 to compatible Siemens PLCs.

SECTION 6 Use with Modicon PLCs

This section describes specific hardware configuration requirement and equipment necessary to connect NT31/631 compatible Modicon PLCs

APPENDIX A Error Messages and Troubleshooting

This appendix contains common error messages, provides descriptions of the problem, and offers solutions.

APPENDIX B Address Conversion Table

This appendix contains Address Conversion Table.

Notice

OMRON products are manufactured for use according to proper procedures by a qualified operator, and only for the purposes described in this manual.

The following conventions are used to indicate precautions:

⚠**WARNING** **This message indicates information that, if not observed, could result in death or serious injury.**

⚠**CAUTION** **Indicates information that, if not heeded, could result in relatively serious or minor injury, damage to the product or faulty operation.**

Precautions

This section provides general precautions for using the Omron Programmable Terminal (PT) and related devices.

Intended Audience

This manual is intended for the following personnel, who must also have knowledge of electrical systems (an electrical engineer or the equivalent).

- Personnel in charge of installing FA systems.
- Personnel in charge of designing FA systems.
- Personnel in charge of managing FA systems and facilities.

General Precautions

The user must operate the product according to the performance specifications described in the operation manuals.

Before using the product under conditions which are not described in the manual or applying the product to nuclear control systems, railroad systems, aviation systems, vehicles, combustion systems, medical equipment, amusement machines, safety equipment, and other systems, machines, and equipment that may have a serious influence on lives and property if used improperly, consult your OMRON representative.

Make sure that the ratings and performance characteristics of the product are sufficient for the systems, machines, and equipment, and be sure to provide the systems, machines, and equipment with double safety mechanisms.

This manual provides information for using the Programmable Terminal. Be sure to read this manual before attempting to use the software and keep this manual close at hand for reference during operation.

⚠WARNING Do not use input functions such as PT touch switches for applications where danger to human life or serious damage is possible, or for emergency switch applications.

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SECTION 1

Connectable Hardware Combinations

This section gives an overview of system requirements necessary to use NT31/631 with Allen-Bradley, GE Fanuc, or Siemens PLCs.

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1-1 System Overview

Use the NT631 and NT31 to communicate directly with Allen-Bradley, GE Fanuc, Siemens, and Modicon PLCs. These operator interfaces communicate with the Allen-Bradley SLC 500 family, PLC5 series, and MicroLogix controllers using the DF1 protocol and use the SNP-X protocol to communicate with GE Fanuc's 90-20 or 90-30 PLC series. NT631 and NT31 use Prodave HMI protocol in conjunction with Siemens HMI Adapter to communicate with Siemens S7-300 and S7-400 PLCs. NT631 and NT31 use Modbus protocol to communicate with Modicon TSX Micro,Premium, and Quantum PLCs.

These operator interfaces use familiar addressing schemes to quickly program the NT631 and NT31 using Allen-Bradley, GE Fanuc, Siemens, Modicon's PLC address formats.

Figure 1-1 Using NT31/631 with Allen-Bradley

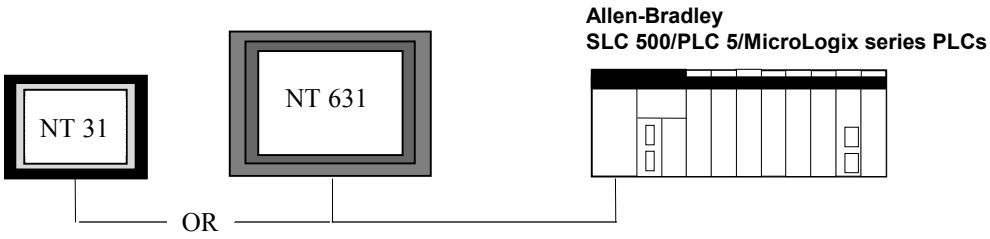


Figure 1-2 Using NT31/631 with GE Fanuc

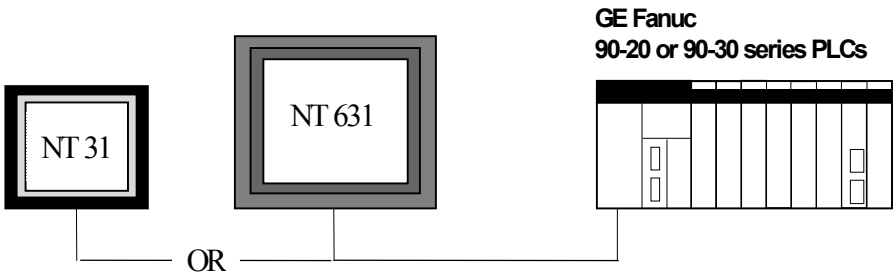


Figure 1-3 Using NT31/631 with Siemens

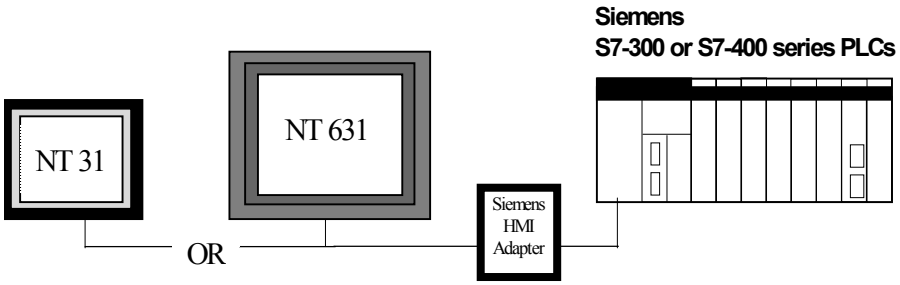
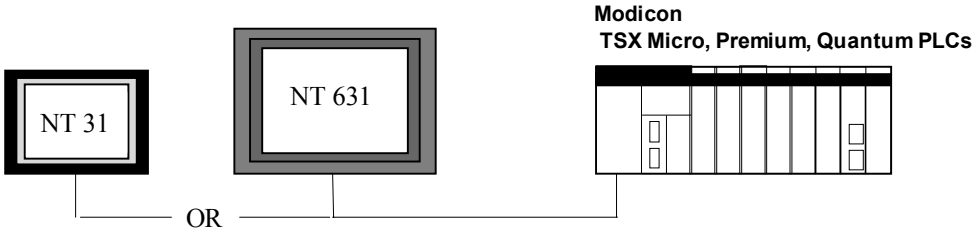


Figure 1-4 Using NT31/631 with Modicon



1-2 System Requirements

The following lists the numbers of compatible devices necessary to use NT31/631 PTs with Allen-Bradley SLC 500; GE Fanuc Series 90-20 and 90-30 PLCs; and Siemens S7-300 and S7-400 PLCs;and Modicon TSX Micro ,Premium and Quantum PLCs.

PT Models:

NT31C-ST141 (B)-E	NT31C-ST141 (B)-EV1	NT31C-ST141(B)-EV2
NT31-ST121 (B)-E	NT31-ST121 (B)-EV1	NT31-ST121(B)-EV2
NT631C-ST151 (B)-E	NT631C-ST151 (B)-EV1	NT631C-ST151(B)-EV2
NT631C-ST141 (B)-E	NT631C-ST141 (B)-EV1	NT631C-ST141(B)-EV2
NT631-ST211 (B)-E	NT631-ST211 (B)-EV1	NT631-ST211(B)-EV2

PLC Vendors:

Allen-Bradley SLC 500 PLCs:

SLC-5/02 with 1747-KE Communications Module
SLC-5/03
SLC-5/04
SLC-5/05

GE Fanuc Series 90-20 and 90-30 PLCs:

Series 90-20 with SNP-X support
Series 90-30 with built-in serial port and SNP-X support
Series 90-30 CMM Module configured for SNP-X operation

Siemens S7-300 and S7-400 PLCs using Siemens HMI Adapter:

S7-300	**S7-400**
CPU312	CPU412-1
CPU313	CPU413-1
CPU314	CPU413-2
CPU315	CPU414-1
CPU315-2-DP	CPU414-2-DP
	CPU416-1
	CPU416-DP

Protocol – the interface between NT31/631 and a Siemens PLC is provided by Prodave HMI protocol. This protocol requires use of a Siemens HMI Adapter provided by Siemens (Siemens Part# 6ES7-972-OCA10-OXAO)

.

Modicon TSX Micro,Premium,Quantum PLCs;

Micro	Premium	Quantum
TSX 37 21 001	TSX P57 102M	140 CPU 113 02
TSX 37 21 101	TSX P57 202M	140 CPU 113 03
TSX 37 22 001	TSX P57 252M	140 CPU 434 12
TSX 37 22 101	TSX P57 302M	140 CPU 534 14
	TSX P57 352M	
	TSX P57 402M	
	TSX P57 452M	

Personal Computer:

Specifications listed in *NT-series Support Tool for Windows Ver. 4.1 Operation Manual* (V061-E1-□), Section 1-2. NTST version 4.2 must be installed.

To communicate between Personal Computer and PT (available from Omron):

Cable Type	Connector (pin:pin)	Omron Part Number
Programming Cable	9:9	C200H-CN229-EU
Programming Cable	9:25	C200H-CN220-EU

1-3 Preparing NT31/631 for Software Installation with System Installer and Downloading the System Program

This section describes how to prepare the NT31/631 for Allen-Bradley, GE Fanuc, Siemens and Modicon software installation using the NT31/631 System Installer. It also outlines how to use the NT-series System Installer to download Allen-Bradley, GE Fanuc, Siemens and Modicon system programs from your personal computer to the PT

The section assumes that you have installed NT Series Support Tool Ver. 4.2 with the NT-Series System Installer on your personal computer to default paths. To install the NTST software, please refer to the *NT-series Support Tool for Windows Ver. 4.1 Operation Manual* (V061-E1-□).

When using NT31/631 with Allen-Bradley, GE Fanuc, Siemens, or Modicon PLCs, you will not have programming console support.

1-3-1 Preparing NT31/631 for Software Installation with System Installer

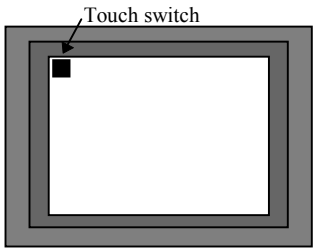
If the NT31/631 has no system program installed, or if the system program is destroyed, System Installer is activated when the PT is powered ON.

To use NT31/631 with Allen-Bradley, GE Fanuc, Siemens, or Modicon PLCs, you must manually start System Installer and clear Omron's system program from the PT. You can then download the system program for Allen-Bradley, GE Fanuc, Siemens, or Modicon PLCs. When downloading the system program to the PT, you must use port A on the PT. This section outlines the steps necessary to run System Installer and clear the existing program.

■ **To prepare NT31/631 for system installation with System Installer:**

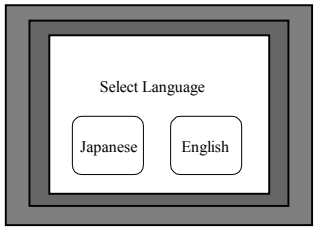
While holding down the touch switch in the top left corner of the PT, reset the PT using the Reset Button located on the back of the PT or by powering on the PT. See Figure 1-5

Figure 1-5 Manually Starting the System Installer



The *Select Langua*ge screen appears. See Figure 1-6.

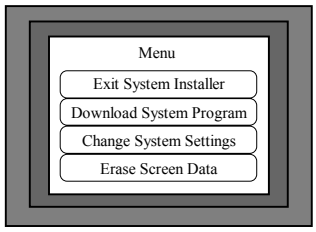
Figure 1-6 Select Language Screen



1. Select *English* or *Japanese* by touching the appropriate switch (this addendum assumes you choose English here).

   The *System Installer Menu* appears. See Figure 1-7.

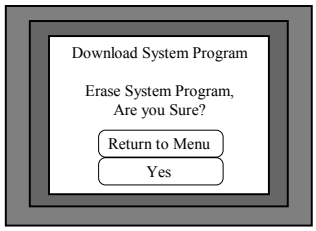
Figure 1-7 Select System Installer Menu



2. Select *Download System Program*.

   The *Download System Program - Erase System Program* screen appears. See Figure 1-8.

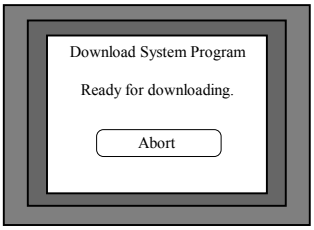
Figure 1-8 Select Download System Program - Erase System Program



3. Select *Yes* to erase the system program. See Figure 1-8

   The old system program is cleared and the *Download System Program - Ready* screen appears. See Figure 1-9.

Figure 1-9 Downloading the System Program - Ready



If *Return to Menu* is selected, the NT31/631 returns to *System Installer* without clearing the system program. If clearing fails, a screen display asking whether you wish to try again. When the system program clears successfully, the NT31/631 enters standby status for downloading of the Allen-Bradley, GE Fanuc, Siemens, or Modicon system program. If you select *Abort*, a screen display asking whether you wish to try again.

1-3-2 Using the NT-series System Installer

The NT-series System Installer uses your personal computer to download the system program for a PLC to the PT. NTST V4.2 allows you to download Allen-Bradley, GE Fanuc, Siemens, Modicon system programs to NT31/631 for compatible PLCs. This section outlines steps necessary to download a new system program for the NT31/631. See Section 1-2 for compatible PT and PLC combinations.

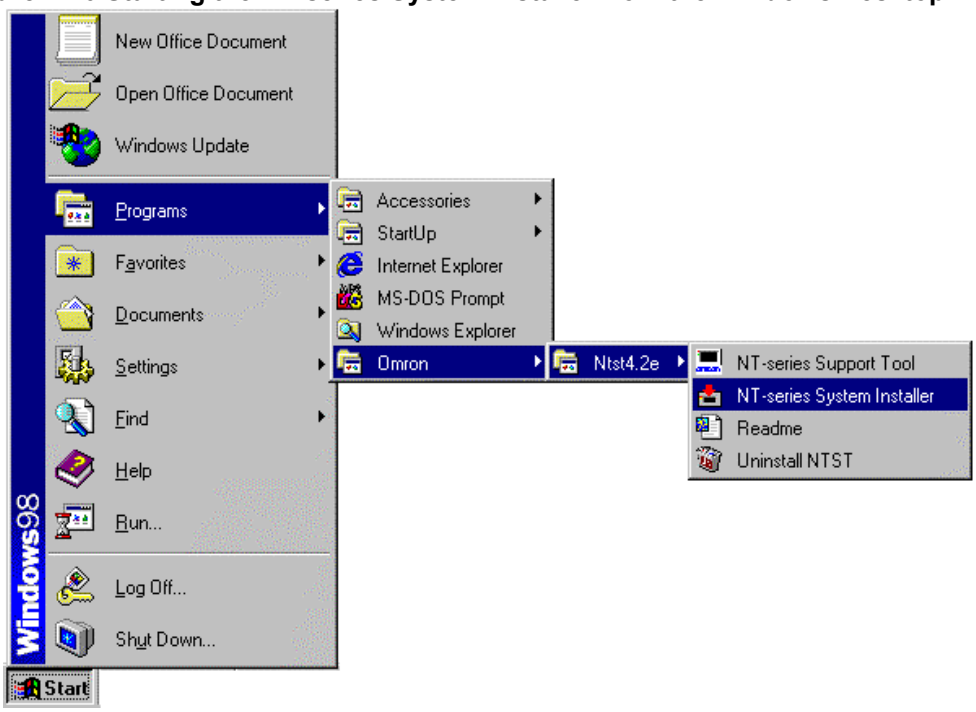
1-3-2-1 Starting the NT-series System Installer

There are two ways to start the NT-series System Installer: from the Windows desktop and from NTST. Figure 1-10 illustrates starting the NT-series System Installer from the Windows desktop. Figure 1-11 illustrates starting the NT-series System Installer from NTST.

■ **To start the NT-series System Installer from the Windows Desktop:**

1. Click on with Windows *Start* button.
2. Select *Programs*.
3. Select *Omron*.
4. Select *Ntst4.2*
5. Select *NT-series System Installer*.
   The NT-series System Installer window displays. See Figure 1-11.

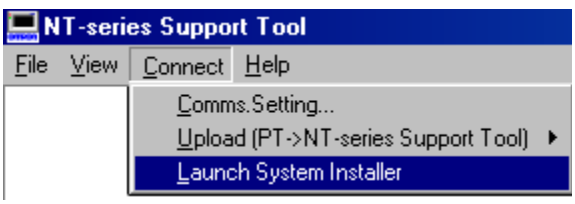
Figure 1-10 Starting the NT-series System Installer from the Windows Desktop



■ **To start the NT-series System Installer from within NTST:**

1. Click on with Windows *Start* button.
2. Select *Programs*.
3. Select *Omron*.
4. Select *Ntst4.2*.
5. Select *NT-series Support Tool*.
6. Click on *Connect*.
7. Select *Launch System Installer*. See Figure 1-10.

Figure 1-11 Starting the NT-series System Installer from within NTST



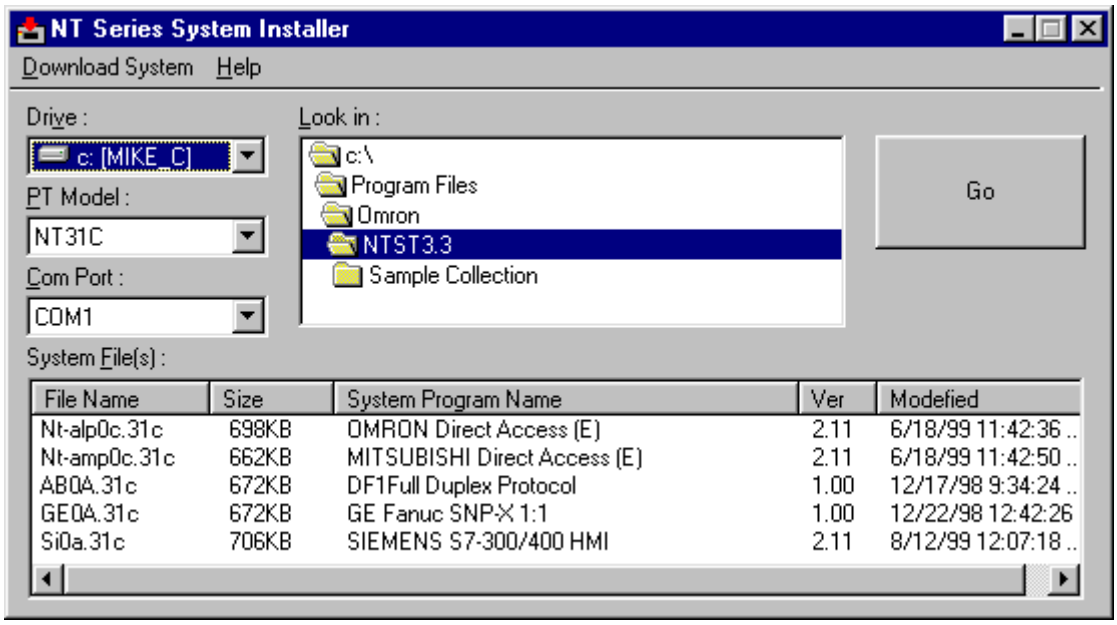
The NT-series System Installer window displays. See Figure 1-11.

1-3-2-2 Installing the System Program

1-3 Preparing NT31/631 for Software Installation with System Installer and Downloading the System Program

This section describes how to install the System Program for Allen-Bradley, GE Fanuc, Siemens, or Modicon PLCs using the NT-Series System Installer. Use system installer to select your PT model. You must know which communication port you are using on your personal computer to transmit the data to the PT. In addition, you need to know which drive and folder contain the appropriate system program. If the files are located on a network drive, you must map the drive before you can use it.

Figure 1-12 NT-series System Installer window



■ To use NT-series System installer to install Allen-Bradley, GE Fanuc, Siemens or Modicon software to the PT:

1. Select the drive containing the system program from the *Drive* drop-down list.

   Folders on the selected drive appear.
2. Select the system program's folder from the *Look in* drop-down list.

   File names appear in the *System File(s)* list.
3. Select the PT model to be used from the *PT Model* drop-down list.

   Files appear in the *System File(s)* list which correspond to the PT model selected.
4. Select the communication port used on your personal computer to transmit data to the PT from the *Com Port* drop-down list.

   Note: You may only use port A on the PT when downloading the system program from the Personal Computer to the PT.
5. Select the system file for your PLC vendor from the *System File(s)* list.

   Note: See Table 1-1 for file naming conventions.
6. Double click on the system file name or click *Go* to begin installing the selected system program.

   The screen indicates the progress of the download.
7. Click *OK* on the NT-series System Installer when the system program installation is complete.

   When the download is complete, the *Download System Program - Download Complete* screen appears on the PT. See Figure 1-13.

Figure 1-13 Downloading the System Program - Download Complete

8. Select *Run System* on the PT.

   The system program re-starts the PT.

Table 1-1 File Naming Conventions

File Prefix	PLC Vendor
AB	Allen-Bradley
GE	GE Fanuc
SI	Siemens
MOD	Modicon

File Extension	PT Model
.31	NT31
.31c	NT31C
.631	NT631
.63c	NT631C

1-3-2-3 Exiting the NT-series System Installer

■ **Use one of the following procedures to exit the NT-series System Installer:**

- Select *Download System* and *Exit*.
- Click on the ☒ button in the upper right corner of the main window.
- Double-click on the NT-series System Installer icon in the upper left section of the main window.
- Click on the NT-series System Installer icon in the upper left section of the main window, then select *Close* in the control menu box.
- Press Alt+F4

SECTION 2

Using NTST with Allen-Bradley, GE Fanuc, Siemens or Modicon PLCs

NTST version 4.2 allows you to create screen data for NT31/631 using Allen-Bradley, GE Fanuc, Siemens, or Modicon PLCs. To do so, you must configure NTST to use Allen-Bradley, GE Fanuc, Siemens, or Modicon addressing. This section describes how to configure NTST for use with Allen-Bradley, GE Fanuc, Siemens, or Modicon PLCs. Please see Section 1-2 for compatible PT and PLC vendors.

This section assumes that you have installed NT-series Support Tool Ver. 4.2 with the NT-Series System Installer on your personal computer. To install the NTST software, please see *NT-series Support Tool for Windows Ver. 4.1 Operation Manual* (V061-E1-□).

When using NT31/631 with Allen-Bradley, GE Fanuc, or Siemens PLCs, you will not have programming console support.

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2-1 Configuring NTST for Allen-Bradley, GE Fanuc, Siemens, or Modicon PLCs

Before you create screens for the NT31/631 for use with Allen-Bradley, GE Fanuc, Siemens or Modicon PLCs, you must configure NTST to use the appropriate PLC. For a list of compatible PT and PLC vendors, please see Section 1-2.

This section outlines how to access the Configuration screen and select your PT and PLC vendor.

2-1-1 Accessing the Configuration Screen

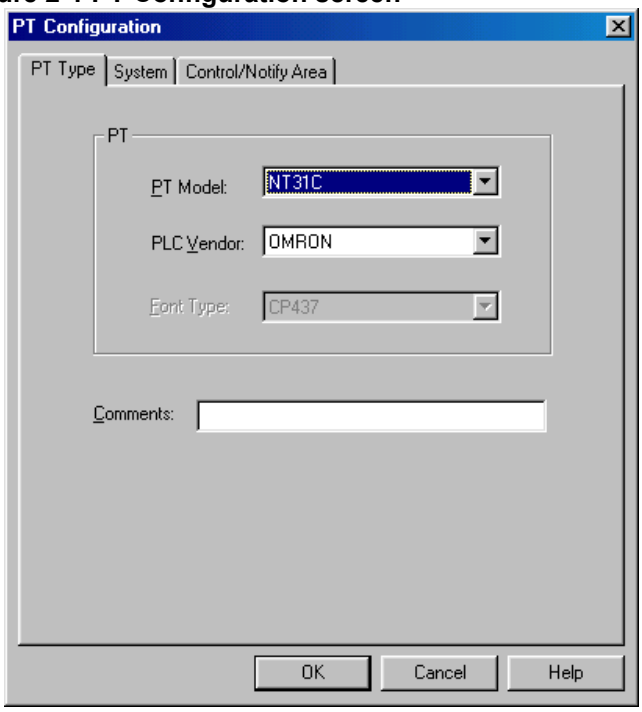
To configure NTST for use with Allen-Bradley, GE Fanuc, Siemens or Modicon PLCs, you use the Configuration screen.

There are two ways to access the PT Configuration screen: when creating a new file or from an existing file.

■ **To access the Configuration screen for a new file:**

1. Launch NTST.
   The application opens; an empty screen displays.
2. The PT Configuration screen appears. See Figure 2-1.

Figure 2-1 PT Configuration screen



■ **To access the Configuration screen for an existing file:**

1. Launch NTST.
   The application opens; an empty screen displays.
2. Select *File* then *Open*.
3. Open an existing file.
   The selected file opens.
4. Select *Tools* then *PT Configuration*.
   The PT Configuration screen appears. See Figure 2-1.

2-1-2 Choosing the PT and PLC Vendor

When the PT Configuration screen opens, it defaults to the PT Type tab. You use this tab to select your PT and PLC vendor.

■ **To select your PT and PLC vendor:**

1. Select the appropriate PT model from the *PT Model* drop-down menu.
2. Select the appropriate PLC vendor from the *PLC Vendor* drop-down menu.
3. Enter appropriate comments in the *Comments* text box.
   All selected information appears on the Configuration screen. You now configure the PLC address on the Control/Notify Area tab. See Section 2-2..

The following table specifies what is available for which PT Model:

	Omron	Mitsubishi A	Mitsubishi Fx	Memory Link	Allen-Bradley	GE Fanuc	Siemens	Modicon
NT31/31C/631/631C-V2 (System Ver.3.1)	√	√	√	√	√	√	√	√
NT31/31C/631/631C-V1 (System Ver. 2.1)	√	√	√	√			√	
NT31/31C/631/631C-V1	√	√	√	√				
NT31/31C/631/631C	√				√	√		
NT30/30C, NT620C/620S,NT 625C, NT600S, NT20S, NT11S	√							

√ = supported

■ **Font type and NT30/620 Compatible Mode**

When one of NT31/31C/631/631C-V2(System Ver.3.1) is selected as PT Model, Font Type and NT30/620 Compatible Mode will be activated. Please refer to NT-series Support Tool for Windows Ver. 4.1 Operation Manual (V061-E1-□) for details.

2-2 Setting the Control/Notify Area

After you configure NTST to use the desired PLC, you configure the addressing through setting the Control/Notify Area.

You use the Control/Notify Area to allocate PLC memory to the PT, which allows the PT and PLC to exchange data. NT31/631 requires five words of Control Area and two words of Notify Area within PLC memory. For V1 Model PTs the Window Control Area is available and requires nine words. This area is used exclusively by the PT. The words may not be used for any other purpose in the PLC program. Please refer to *NT-series Support Tool for Windows Ver. 4.1 Operation Manual* (V061-E1-☐) for further details.

You must program the first word of the Control Area with desired initial (start) screen number value. NT31/631 recognizes 0 as a blank screen, which is the typical value at first word of the Control Area. If the first word is not programmed correctly, you will receive a blank screen on the PT.

This section outlines the steps necessary to set the Control/Notify Area in NTST for Allen-Bradley, GE Fanuc, Siemens, and Modicon PLCs.

2-2-1 Setting the Control/Notify Area for Allen-Bradley

This section outlines the steps necessary to set the Control/Notify Area in NTST for Allen-Bradley PLCs. This section assumes that you understand the addressing scheme used by your Allen-Bradley PLC. Please see your Allen-Bradley user manual for assistance with addressing scheme.

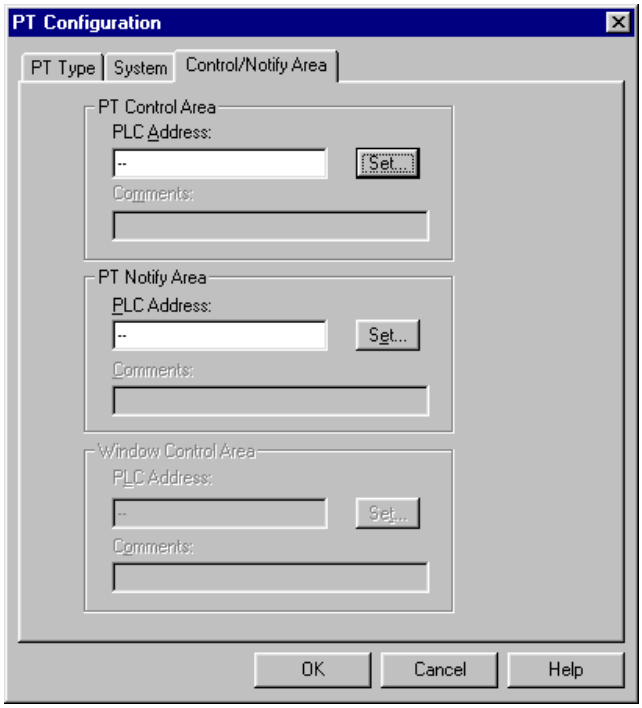
Note*:* You can use Allen-Bradley's hand-held or PC-based software to allocate memory in "B" Bit or "N" Integer area of the PLC.

■ To set the Control Area for Allen-Bradley:

1. Click the Control/Notify Area tab.

   The Control/Notify Area window appears. See Figure 2-2.

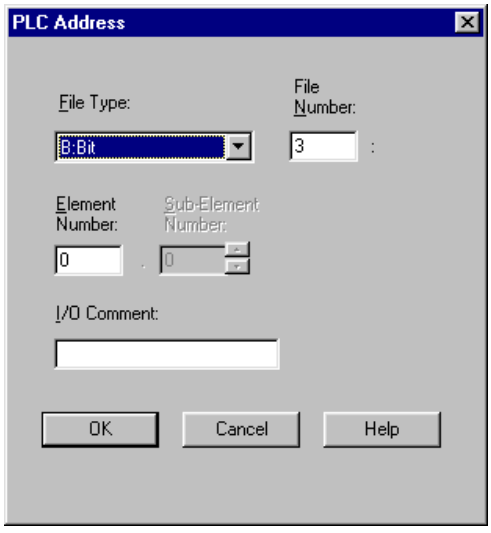
Figure 2-2 Control/Notify Area tab



2. Click on the *Set* button in the PT Control Area group box.

   The PLC Address screen appears. See Figure 2-3.

Figure 2-3 PLC Address screen for Allen-Bradley



3. Use the necessary addressing fields to specify the start address of the Control Area.
4. Click *OK* to accept the values you set. Click *Cancel* to return to the Control/Notify screen without changing Control Area values.

   The Control/Notify Area screen reappears. The information entered on the PLC Address screen populates the PT Control Area group box.

■ **To set the Notify Area for Allen-Bradley:**

1. Click the Control/Notify Area tab.

   The Control/Notify Area window appears. See Figure 2-2.

2. Click on the *Set* button in the PT Notify Area group box.

   The PLC Address screen appears. See Figure 2-3.

3. Use the necessary addressing fields to specify the start address of the Notify Area.

   Note*:* The start address of Notify area must be at least five words apart from start address of the Control Area.

4. Click *OK* to accept the values you set. Click *Cancel* to return to the Control/Notify screen without changing Notify Area values.

   The Control/Notify Area screen reappears. The information entered on the PLC Address screen populates the PT Notify Area group box.

5. Click *OK* on the Control/Notify Area screen.

   A new application window opens and you are ready to create your screen data.

2-2-2 Setting the Control/Notify Area for GE Fanuc

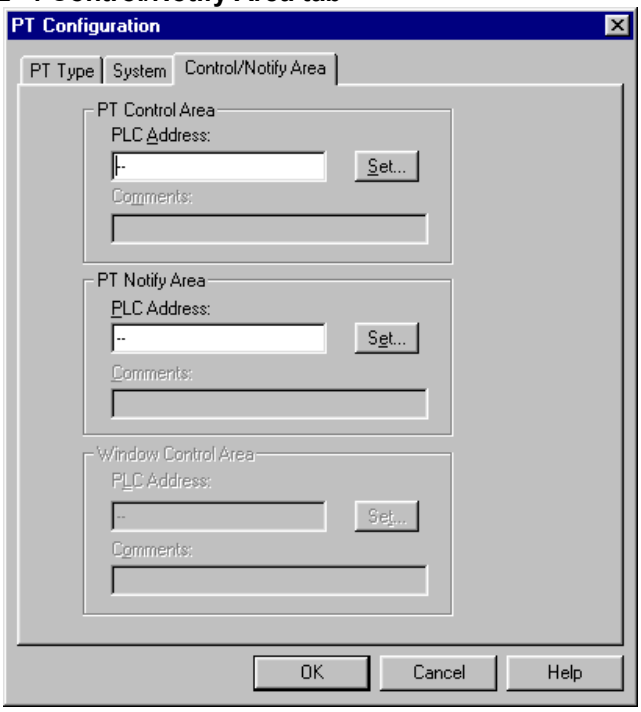
This section lists the steps necessary to set the Control/Notify Area in NTST for GE Fanuc PLCs. This section assumes that you understand the addressing scheme used by your GE Fanuc PLC. Please see your GE Fanuc user manual for assistance with addressing scheme.

■ To set the Control Area for GE Fanuc:

1. Click the Control/Notify Area tab.

   The Control/Notify Area window appears. See Figure 2-4.

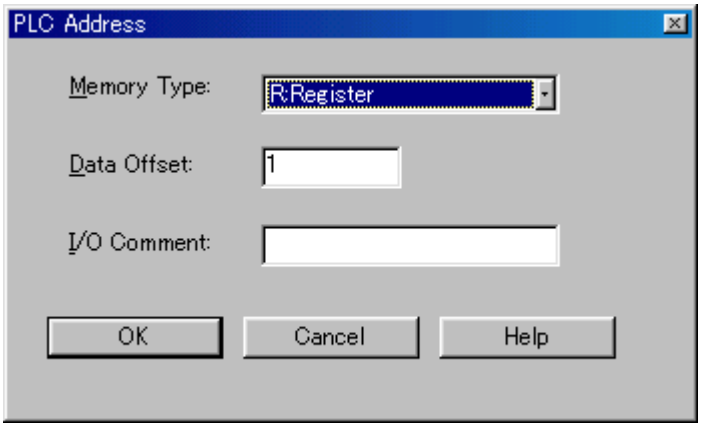
Figure 2- 4 Control/Notify Area tab



2. Click on the *Set* button in the PT Control Area group box.

   The PLC Address screen appears. See Figure 2-5.

Figure 2-5 PLC Address screen for GE Fanuc



3. Use the necessary addressing fields to specify the start address of the Control Area.
4. Click *OK* to accept the values you set. Click *Cancel* to return to the Control/Notify screen without changing the Control Area values.

   The Control/Notify Area screen reappears. The information entered on the PLC address screen populates the PT Control Area group box.

■ To set the Notify Area for GE Fanuc:

1. Click the Control/Notify Area tab.

   The Control/Notify Area window appears. See Figure 2-4.

2. Click on the *Set* button in the PT Notify Area group box.

   The PLC Address screen appears. See Figure 2-5.

3. Use the necessary addressing fields to specify the start address of the Notify Area.

Note: The start address of Notify area must be at least five words apart from start address of the Control Area.

4. Click *OK* to accept the values you set. Click *Cancel* to return to the Control/Notify screen without changing Notify Area values.

   The Control/Notify Area screen reappears. The information entered on the PLC Address screen populates the PT Notify Area group box.

5. Click *OK* on the Control/Notify Area screen.

   A new application window opens and you are ready to create your screen data.

2-2-3 Setting the Control/Notify Area for Siemens

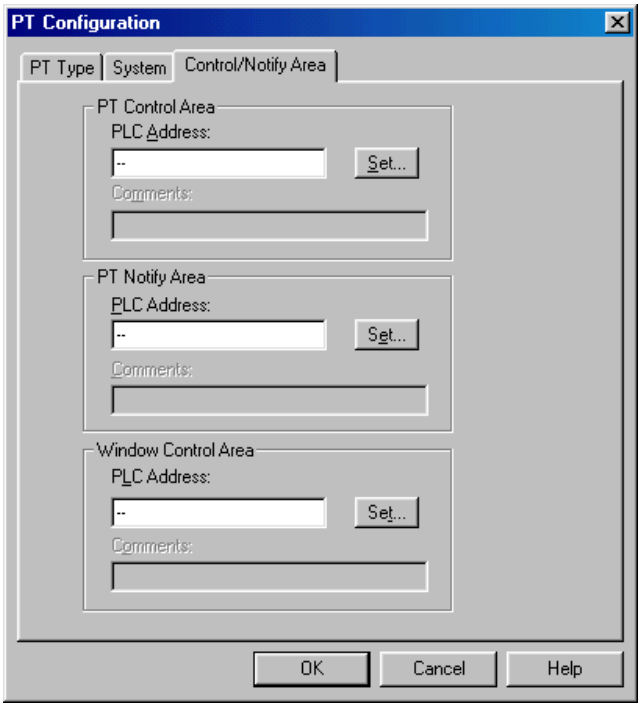
This section lists the steps necessary to set the Control/Notify/Window Control Area in NTST for Siemens PLCs. This section assumes that you understand the addressing scheme used by your Siemens PLC. Please see your Siemens user manual for assistance with addressing scheme.

■ To set the Control Area for Siemens:

1. Click the Control/Notify Area tab.

   The Control/Notify Area window appears. See Figure 2-6.

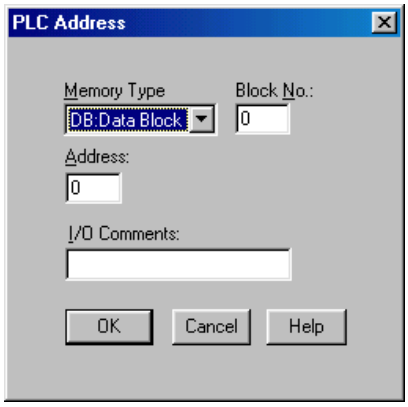
Figure 2-6 PLC Address screen for Siemens



2. Click on the *Set* button in the PT Control Area group box.

   The PLC Address screen appears. See Figure 2-7.

Figure 2-7 PLC Address screen for Siemens



3. Use the necessary addressing fields to specify the start address of the Control Area.
4. Click *OK* to accept the values you set. Click *Cancel* to return to the Control/Notify screen without changing the Control Area values.

   The Control/Notify Area screen reappears. The information entered on the PLC address screen populates the PT Control Area group box.

■ To set the Notify Area for Siemens:

1. Click the Control/Notify Area tab.

   The Control/Notify Area window appears. See Figure 2-6.
2. Click on the Set button in the PT Notify Area group box.

   The PLC Address screen appears. See Figure 2-7.
3. Use the necessary addressing fields to specify the start address of the Notify Area.

   Note: The start address of the Notify area must be at least five words apart from start address of the Control Area.
4. Click OK to accept the values you set. Click Cancel to return to the Control/Notify screen without changing Notify Area values.

   The Control/Notify Area screen reappears. The information entered on the PLC Address screen populates the PT Notify Area group box.

■ To set the Window Control Area for Siemens:

1. Click the Control/Notify Area tab.

   The Control/Notify Area window appears. See Figure 2-6.
2. Click on the Set button in the Window Control Area group box.

   The PLC Address screen appears. See Figure 2-7.
3. Use the necessary addressing fields to specify the start address of the Window Control Area.

   Note: The start address of Window Control area must be at least nine words apart from start address of the Notify Area.
4. Click OK to accept the values you set. Click Cancel to return to the Control/Notify screen without changing Window Control Area values.

   The Control/Notify Area screen reappears. The information entered on the PLC Address screen populates the Window Control Area group box.
5. Click OK on the Control/Notify Area screen.

   A new application window opens and you are ready to create your screen data.

2-2-4 Setting the Control /Notify Area for Modicon

This section lists the steps necessary to set the Control/Notify/Window Area in NTST for Modicon PLCs. This section assumes that you understand the addressing scheme used by your Modicon PLC. Please see your User's Manual of Modicon for assistance with addressing scheme.

Note The notation of address follows the way of TSX Quantum. When you use TSX Micro or Premium, please convert by the following rule.

- To use %M, select "0:Coil" or "1:Input" as memory type.
- To use %MW, select "4:Holding Register" as memory type.
- Add 1 to actual address number in Modicon PLCs for input address number in NTST.

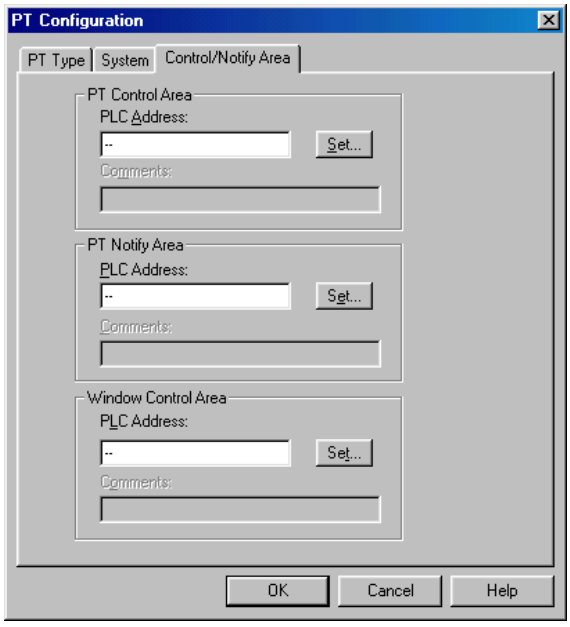
Please refer to the following examples.

Actual Address	Set Address in NTST
%M8	00009
%MW30	40031
%MW40 bit3	40041/3

■ To set the Control Area for Modicon

1. Click the Control/Notify Area tab
   The Control /Notify Area window appears, See Figure 2-8

Figure 2-8 PLC Address screen for Modicon



2. Click on the *Set* button in the PT Control Area group box.
   The PLC Address screen appears. See Figure 2-9.

Figure 2-9 PLC Address screen for Modicon

3. Use the necessary addressing fields to specify the start address of the Control Area.
4. Click *OK* to accept the values you set. Click *Cancel* to return to the Control/Notify screen without changing the Control Area values.

The Control/Notify Area screen reappears. The information entered on the PLC address screen populates the PT Control Area group box.

■ **To set the Notify Area for Modicon:**

1. Click the Control/Notify Area tab.

   The Control/Notify Area window appears. See Figure 2-8.
2. Click on the Set button in the PT Notify Area group box.

   The PLC Address screen appears. See Figure 2-9.
3. Use the necessary addressing fields to specify the start address of the Notify Area.

   Note: The start address of the Notify area must be at least five words apart from start address of the Control Area.
4. Click OK to accept the values you set. Click Cancel to return to the Control/Notify screen without changing Notify Area values.

   The Control/Notify Area screen reappears. The information entered on the PLC Address screen populates the PT Notify Area group box.

■ **To set the Window Control Area for Modicon:**

1. Click the Control/Notify Area tab.

   The Control/Notify Area window appears. See Figure 2-8.
2. Click on the Set button in the Window Control Area group box.

   The PLC Address screen appears. See Figure 2-9.
3. Use the necessary addressing fields to specify the start address of the Window Control Area.

   Note: The start address of Window Control area must be at least nine words apart from start address of the Notify Area.
4. Click OK to accept the values you set. Click Cancel to return to the Control/Notify screen without changing Window Control Area values.

   The Control/Notify Area screen reappears. The information entered on the PLC Address screen populates the Window Control Area group box.
5. Click OK on the Control/Notify Area screen.

   A new application window opens and you are ready to create your screen data.

SECTION 3

Use with Allen-Bradley PLCs

This section describes specific hardware configuration requirements and equipment necessary to connect NT31/631 to compatible Allen-Bradley PLCs.

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3-1 Configuring NT31/631 for Allen-Bradley

This section describes specific hardware configuration requirements and equipment necessary to connect NT31/631 to compatible Allen-Bradley PLCs.

Note: Do not use 9 to 9 pin cable with 9 to 25 pin adapter when connecting the cable to 25 pin port on the PT.

3-1-1 Connecting NT31/631 to Allen-Bradley SLC 5/02

To connect the NT31/631 to the Allen-Bradley SLC 5/02 you need the following equipment:

- Allen-Bradley SLC 5/02 PLC
- 1747-KE Communication Module with 1747-C13 cable provided by Allen-Bradley
- NT31/631 PT with serial cable to connect PT and PLC (please see Section 3-4 for appropriate cable)

■ **To connect NT31 (port B) to Allen-Bradley 5/02:**

1. Connect the 25 pin cable to port B of the NT31.
2. Connect the 9 pin end of the cable to the DF1/RS232 port on the 1747-KE module.
3. Connect the 1747-C13 cable to the DH485 port on the 1747-KE module.
4. Connect the 1747-C13 cable to the DH485 port on the Allen-Bradley SLC 5/02.

■ **To connect NT631 (port A or B) or NT31 (port A) to Allen-Bradley 5/02:**

1. Connect the 9 pin cable (male end) to the 9 pin port of the NT31/631 (port B is default).
2. Connect the 9 pin cable (female end) to the DF1/RS232 port on the 1747-KE module.
3. Connect the 1747-C13 cable to the DH485 port on the 1747-KE module.
4. Connect the 1747-C13 cable to the DH485 port on the Allen-Bradley SLC-5/02.

■ **To configure DF1 / RS232 port on 1747-KE Module:**

1. Set the module for full duplex BSC.
2. Set the module for embedded response.
3. Set detect for automatic.
4. Disable duplicate packet detect.
5. Set the baud rate for 9600, 19200 or 38400.

Figure 3-1 Connecting NT31 to Allen-Bradley 5/02

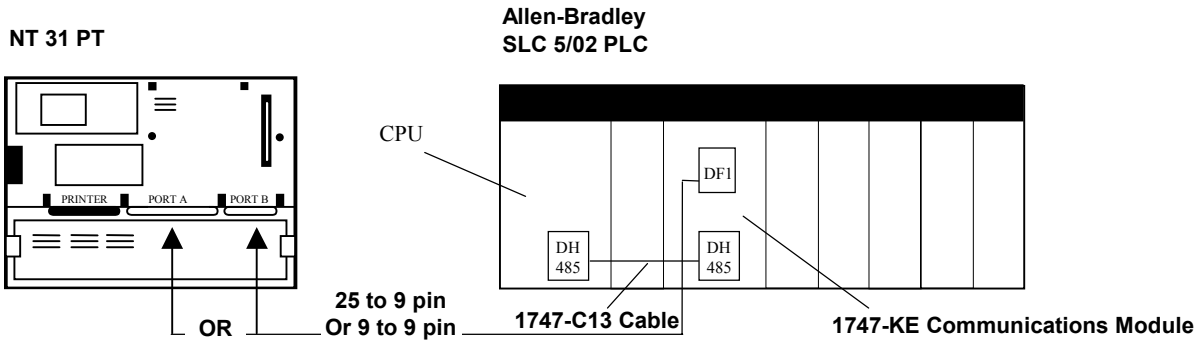
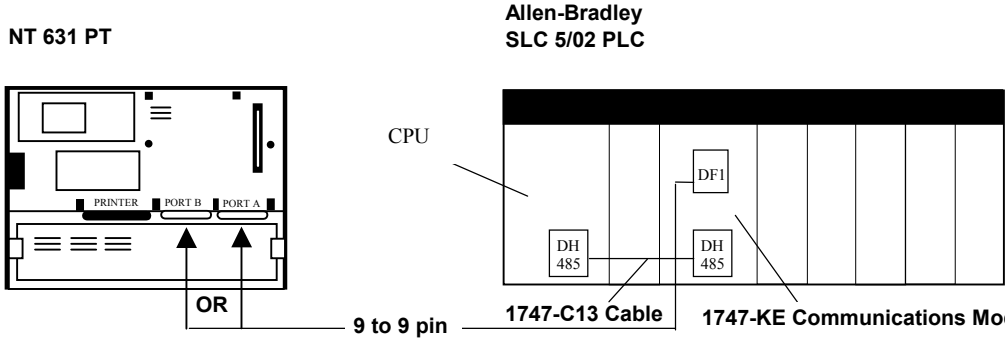


Figure 3-2 Connecting NT631 with Allen-Bradley 5/02



3-1-2 Connecting NT31/631 to Allen-Bradley SLC 5/03, 5/04 and 5/05

To connect the NT631 to the Allen-Bradley SLC 5/03, 5/04 and 5/05 you will need the following equipment:

- Allen-Bradley SLC 5/03, 5/04 or 5/05 PLC
- NT31/631 PT with serial cable to connect PT and PLC (please see Section 3-4 for appropriate cable)

■ **To connect NT31 (port B) to Allen-Bradley 5/03, 5/04 and 5/05:**

1. Connect the 25 pin cable to port B of the NT31.
2. Connect the 9 pin end of the cable to the RS232 port on CPU.

■ **To connect NT631 (port A or B) or NT31 (port A) to Allen-Bradley 5/03, 5/04 and 5/05:**

1. Connect the 9 pin cable (male end) to the 9 pin port of the NT31/631 (port B is default)
2. Connect the 9 pin cable (female end) to the RS232 port on the CPU.

■ **To configure Allen-Bradley 5/03, 5/04 and 5/05 RS232 port:**

1. Set the module for full duplex BSC.
2. Set the module for embedded response.
3. Set detect for automatic.
4. Disable duplicate packet detect.
5. Set the baud rate for 9600, 19200 or 38400.

Figure 3-3 Connecting NT31 to Allen-Bradley 5/03, 5/04 and 5/05

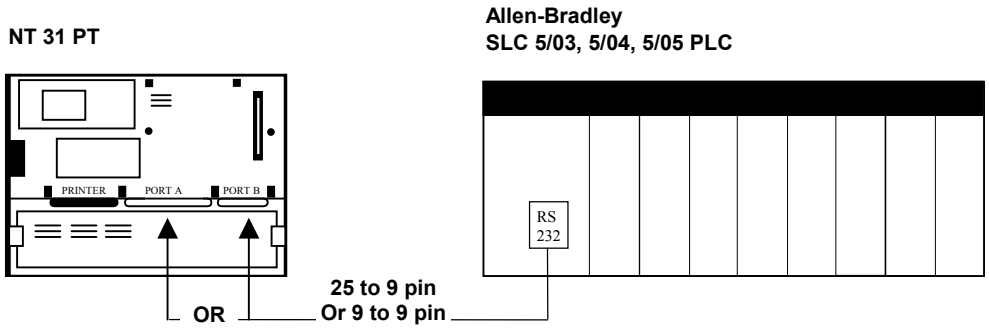
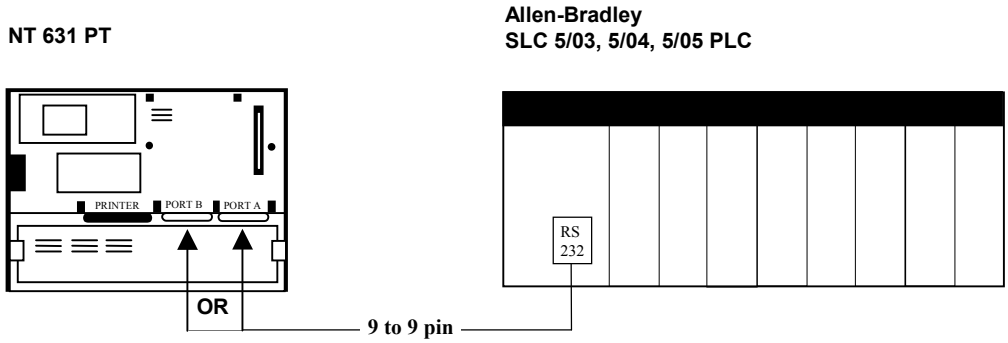


Figure 3-4 Connecting NT631 to Allen-Bradley 5/03, 5/04 and 5/05



3-1-3 Connecting NT31/631 to Allen-Bradley PLC5

To connect the NT31/631 to the Allen-Bradley PLC5 you will need the following equipment:

1. Allen-Bradley PLC5/11, PLC5/20 or PLC5/20C
2. NT31/631 PT with serial cable to connect PT and PLC (please see Section 3-4 for appropriate cable)

■ **To connect NT31 (port B) to Allen-Bradley 5/11, 5/20 and 5/20C:**

1. Connect the 25 pin cable to port B of the NT31.
2. Connect the another 25 pin end of the cable to the RS232 port on CPU.

■ **To connect NT631 (port A or B) or NT31 (port A) to Allen-Bradley 5/11, 5/20 and 5/20C:**

1. Connect the 9 pin cable (male end) to the 9 pin port of the NT31/631 (port B is default)
2. Connect the 25 pin cable (female end) to the RS232 port on the CPU.

■ **To configure Allen-Bradley 5/11, 5204 and 5/20C RS232 port:**

1. Set the module for full duplex BSC.
2. Set Embedded Response Detect of PLC5 for Automatic Mode.
3. Disable duplicate packet detect.
4. Set Error Checking for BCC
5. Set the baud rate for 9600, 19200 or 38400.

Figure 3-5 Connecting NT31 to Allen-Bradley 5/11, 5/20 and 5/20C

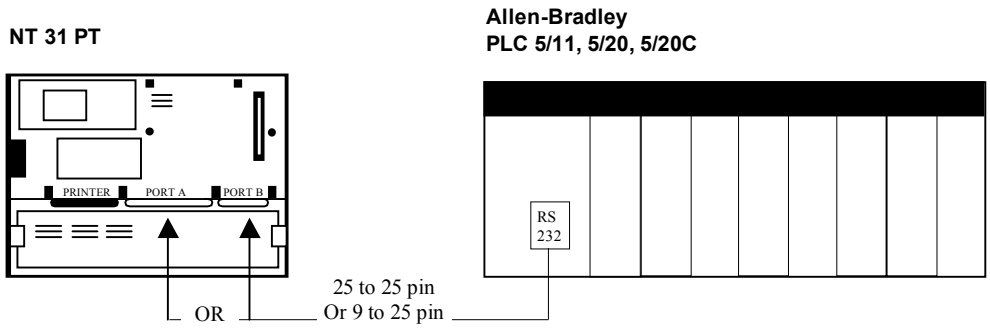
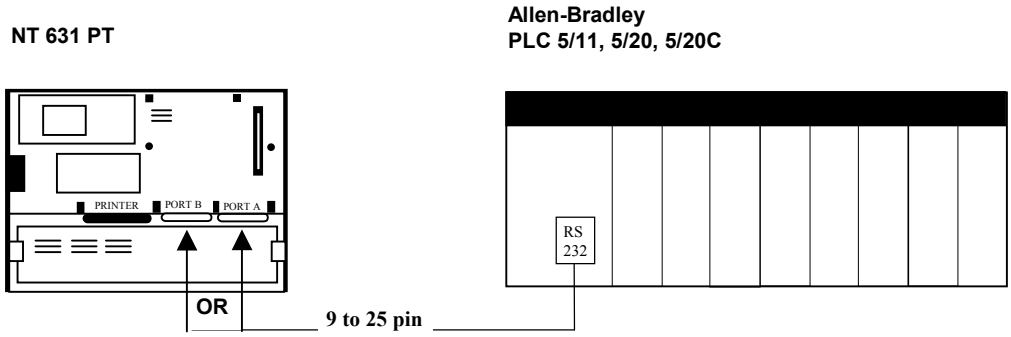


Figure 3-6 Connecting NT631 to Allen-Bradley 5/11, 5/20 and 5/20C



3-1-4 Connecting NT31/631 to Allen-Bradley MicroLogix 1000, 1200 and 1500

To connect the NT631 to the Allen-Bradley MicroLogix 1000, 1200 and 1500 you will need the following equipment:

1. Allen-Bradley MicroLogix 1000, 1200 or 1500
2. NT31/631 PT with serial cable to connect PT and PLC (please see Section 3-4 for appropriate cable)

■ **To connect NT31 (port B) to Allen-Bradley MicroLogix 1000, 1200 and 1500:**

1. Connect the 25 pin cable to port B of the NT31.
2. Connect the 8 pin Mini Din end of the cable to the communication port on controller.

■ **To connect NT631 (port A or B) or NT31 (port A) to Allen-Bradley MicroLogix 1000, 1200 and 1500:**

1. Connect the 9 pin cable (male end) to the 9 pin port of the NT31/631 (port B is default)
2. Connect the 8 pin Mini Din end of the cable to the communication port on controller.

■ **To configure Allen-Bradley MicroLogix 1000, 1200 and 1500 communication port:**

1. Use DF1 Full Duplex driver.
2. Set the baud rate for 9600 or 19,200.
3. Set Error Checking for BCC or CRC .(NT31/631 only support BCC for MicroLogic1500)
4. Set Embedded Response for Auto Detect.
5. Disable duplicate packet detect.

Figure 3-7 Connecting NT31 to Allen-Bradley 5/03, 5/04 and 5/05

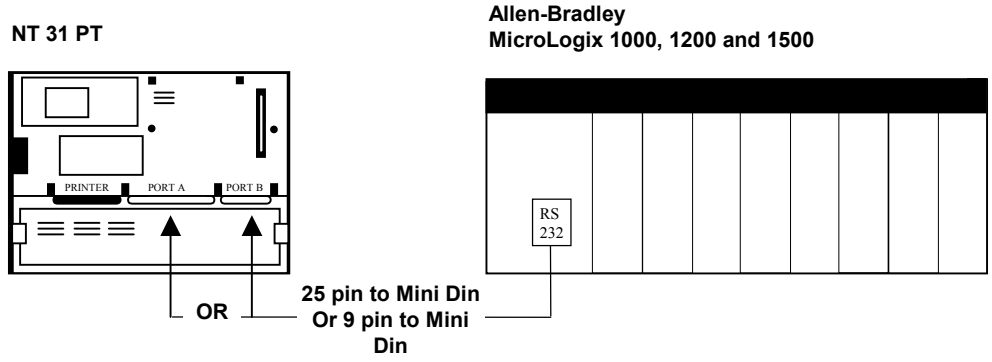
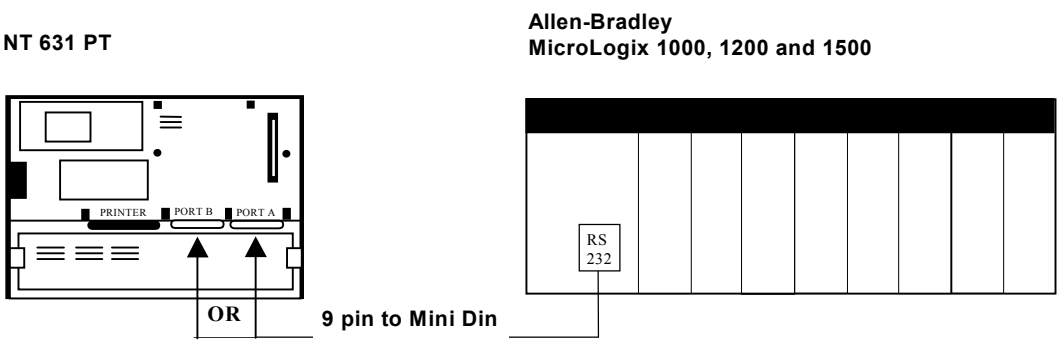


Figure 3-8 Connecting NT631 to Allen-Bradley MicroLogix 1000, 1200 and 1500

3-1 Configuring NT31/631 for Allen-Bradley



3-2 Configuring NT31/631 for Communication with Allen-Bradley PLCs

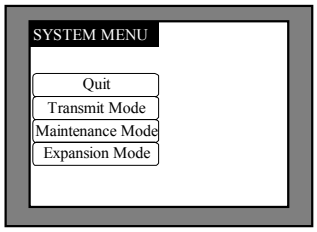
Allen-Bradley PLCs communicates to NT31/631 using the DF1 protocol. This section describes setting the memory switches on the PT for use with Allen-Bradley PLCs. You can configure Port A or Port B on the PT for communications with Allen-Bradley PLCs.

■ **To Configure NT31/631 communication for Allen-Bradley:**

1. Start the PT.
2. Press two corner keys on the PT at the same time to enter the *System Menu*.

   The *System Menu* screen appears. See Figure 3-9.

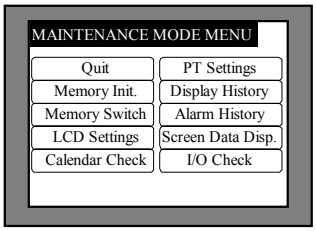
Figure 3-9 System Menu



3. Select *Maintenance Mode*.

   The *Maintenance Mode* menu screen appears. See Figure 3-10.

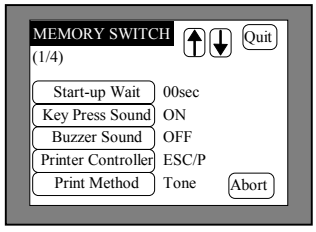
Figure 3-10 Maintenance Mode Menu



4. Select *Memory Switch*.

   The *Memory Switch* screen appears. See Figure 3-11.

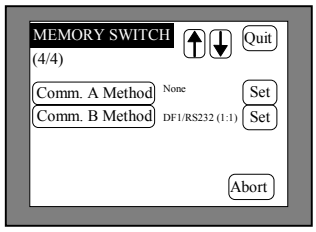
Figure 3-11 Memory Switch screen (1/4)



5. Press the down arrow (next screen) or the up arrow (previous screen) touch switch until the fourth memory switch screen appears.

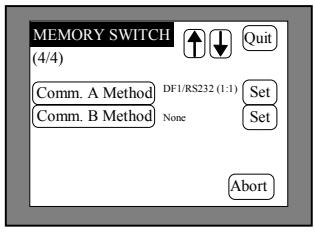
   When you reach the fourth screen, (4/4) displays in the upper left corner of the PT. Port B is the default port for communication between the PT and PLC. DF1/RS232 (1:1) displays to the right of the *Comm. B Method* touch switch. See Figure 3-12. To use Port B skip to step 7.

Figure 3-12 Memory Switch screen (4/4), Comm B Method



6. To use port A, press the *Comm. A Method* touch switch until DF1/RS-232 (1:1) is shown to the right of the touch switch. Press the *Comm. B Method* touch switch until it displays None. See Figure 3-13.

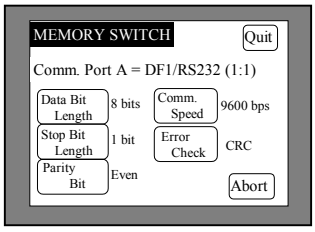
Figure 3-13 Memory Switch screen (4/4), Comm A. Method



7. Press the *Set* touch switch to the right of the selected *Comm. Method* touch switch.

   A screen displays with settings for the selected port. See Figure 3-14.

Figure 3-14 Memory Switch Comm. Port Settings



8. Press each touch switch until the desired setting displays.

   The setting option changes each time the touch switch is pressed.

   Note You may only use 9600 or 19200 for communication between Allen-Bradley and NT31/631. "CRC" cannot be used as *Error Check* for communication with MicroLogix 1500.

9. Press the *Quit* touch switch twice.

   The *Maintenance Mode Menu* screen displays. The communication port and speed settings are saved.

10. Press the *I/O Check* touch switch, then the *I/F check* touch switch, and then *Comm. Port A* or *Comm. Port B*, to confirm communication between the PT and PLC. Press the *Execute* button. If settings are correct, receive data shows '***'. If settings are incorrect, you will receive an error message.

3-3 Allocation Area Table for Allen-Bradley PLCs

Allen-Bradley SLC 500

Memory Type	Identifier	File Number Range	Element Number Range	Sub-Element Number Range	Bit Range
Bit	B	3,9:255	B 0:255	--	0:15
Counter	C	5,9:255	C 0:255	0:2	0:15
Integer	N	7,9:255	N 0:255	--	0:15
Control	R	6,9:255	R 0:255	0:2	0:15
Status	S	2	S 0:255	--	0:15
Time	T	4,9:255	T 0:255	0:2	0:15

Input/Output Settings

Memory Type	Identifier	Slot Number	Word Number	Terminal Number
Input	I	1:30	0:255	0:15
Output	O	1:30	0:255	0:15

Note for PLC5 users:

- *Rack Number* should be entered in place of *Slot Number entry*.
- *Group Number* should be entered in place of *Word Number* entry.
- *Bit Number* should be entered in place of *Terminal Number* in decimal. Valid value are 0 through 15.

3-4 Allen-Bradley Custom Cable Requirements

3-4-1 Custom Cable Cable for SLC5

Figure 3-15 Allen-Bradley to NT31/631 Custom Cable (9 to 9 Pin Connect)

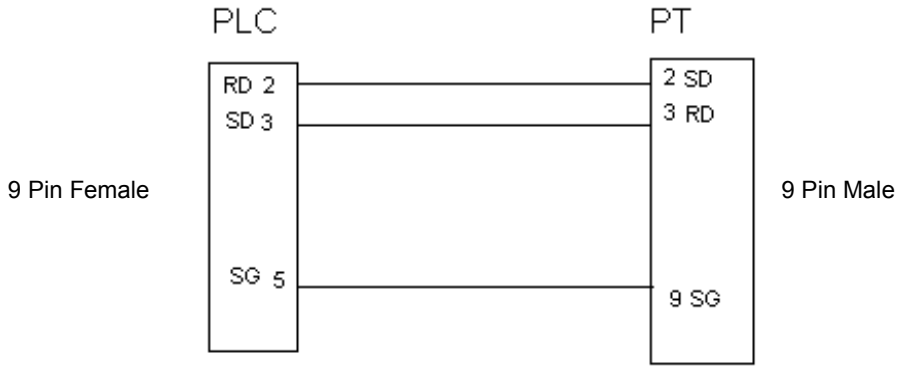
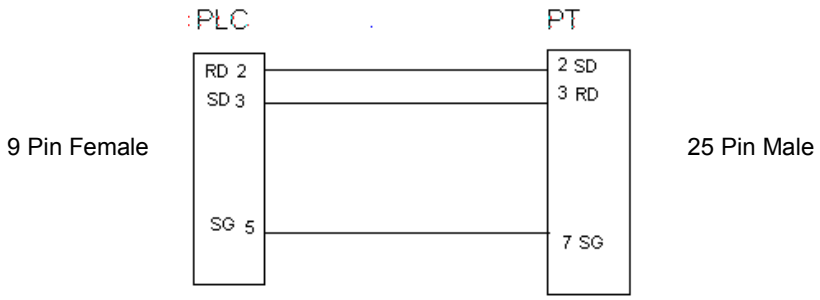


Figure 3-16 Allen-Bradley to NT31/631 Custom Cable (9 to 25 Pin Connect)



3-4-2 Custom Cable for PLC5

Figure 3-17 Allen-Bradley to NT31/631 Custom Cable (25 to 9 Pin Connect)

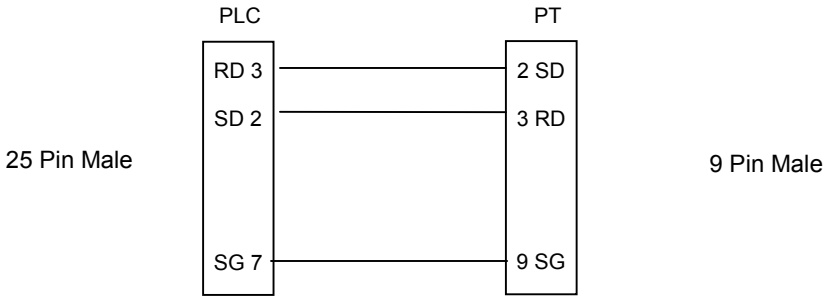
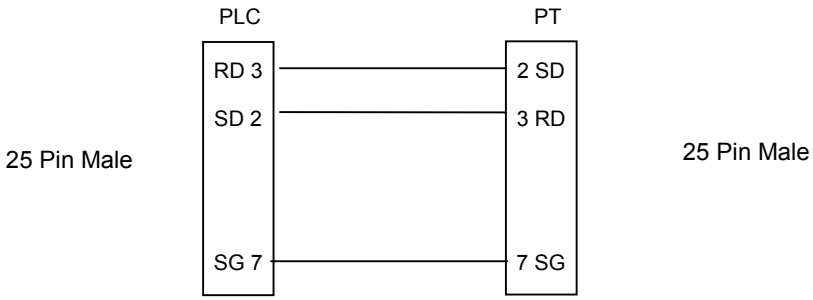


Figure 3-18 Allen-Bradley to NT31/631 Custom Cable (25 to 25 Pin Connect)



3-4-3 Custom Cable for MicorLogic

Figure 3-19 Allen-Bradley to NT31/631 Custom Cable (8 pin Mini Din to 9 Pin Connect)

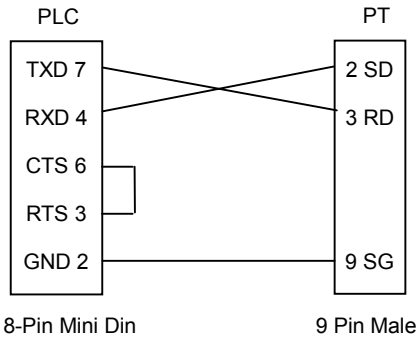
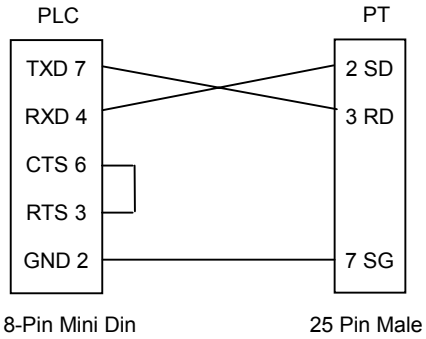


Figure 3-20 Allen-Bradley to NT31/631 Custom Cable (8 pin Mini Din to 25 Pin Connect)



SECTION 4

Use with GE Fanuc PLCs

This section describes specific hardware configuration requirements and equipment necessary to connect NT31/631 to compatible GE Fanuc PLCs.

In This Section

4-1 Configuring NT31/631 for GE Fanuc 36

4-1-1 Connecting NT31/631 to GE Fanuc 90-20 or 90-30 with Built-in Serial Port.....36

4-1-2 Connecting NT31/631 to GE Fanuc 90-30 with CMM Module 37

4-2 Configuring NT31/631 for Communication with GE Fanuc PLCs 39

4-3 Allocation Area Table for GE Fanuc PLCs 41

4-4 GE Fanuc Custom Cable Requirements 41

4-5 GE Fanuc CMM Module Custom Cable Requirements 42

4-1 Configuring NT31/631 for GE Fanuc

This section describes specific hardware configuration requirements and equipment necessary for connecting NT31/631 to compatible GE Fanuc 90-20 or 90-30 PLCs.

Note: Do not use 9 to 9 pin cable with 9 to 25 pin adapter when connecting the cable to 25 pin port on the PT.

4-1-1 Connecting NT31/631 to GE Fanuc 90-20 or 90-30 with Built-in Serial Port

To connect the NT31/631 to the GE Fanuc 90-30 with a built-in serial port you will need the following equipment:

- GE Fanuc 90-20 or 90-30 PLC with a built-in serial port
- 15 to 25 pin adapter (available from GE Fanuc) or 15 to 9 pin adapter (available from Horner Electric)
- NT31/631 PT with serial cable to connect PT and PLC (please see Section 4-4 for appropriate cable)

■ To connect NT31 (port B) to GE Fanuc 90-20 or 90-30 with built-in serial port:

1. Connect the 25 pin cable to port B of the NT31.
2. Connect the 9 pin end of the cable to the 15 to 9 pin adapter.
3. Connect the adapter to the SNP port on the GE Fanuc 90-30 with built-in serial port.

■ To connect NT31/631 (port A or B) or NT31 (port A) to GE Fanuc 90-20 or 90-30 with built-in serial port:

1. Connect the 9 pin cable (male end) to the 9 pin port of the NT31/631 (port B is default).
2. Connect the 9 pin cable (female end) to the 15 to 9 pin adapter.
3. Connect the adapter to the SNP port on the GE Fanuc 90-30 with built-in serial port.

■ To configure serial port for GE Fanuc:

1. Configure the GE Fanuc serial port for SNP-X mode.
2. Set the baud rate for 9600 or 19,200.

Figure 4-1 Connecting NT31 to GE Fanuc with Built-in Serial Port

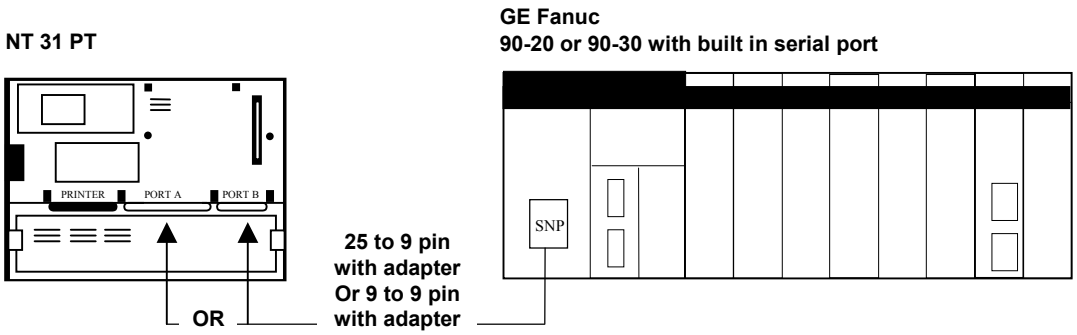
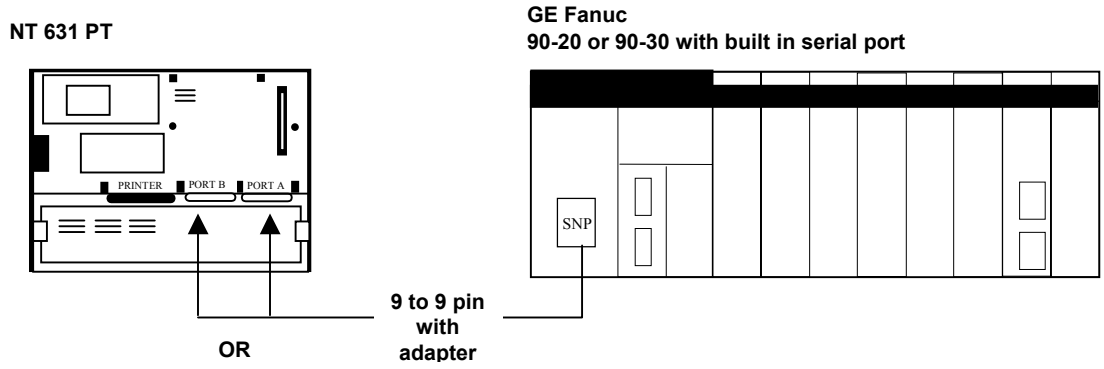


Figure 4-2 Connecting NT631 to GE Fanuc with Built-in Serial Port



4-1-2 Connecting NT31/631 to GE Fanuc 90-30 with CMM Module

To connect the NT31 to the GE Fanuc 90-30 with a CMM module you will need the following equipment:

- GE Fanuc 90-30 PLC with CMM module
- NT31/631 PT with serial cable to connect PT and PLC (please see Section 4-4 for appropriate cable)

■ **To connect NT31 (port B) to GE Fanuc 90-30 with CMM module:**

1. Connect the 25 pin cable to port B of the NT31.
2. Connect the 25 pin end of the cable to the RS232 port on the CMM module.

■ **To connect NT631 (port A or B) or NT31 (port A) to GE Fanuc 90-30 with CMM module:**

1. Connect the 9 pin cable to the 9 pin port of the NT31/631 (port B is default).
2. Connect the 25 pin end of the cable to the RS232 port on the CMM module.

■ **To configure serial port for CCM Module:**

1. Configure the CMM Module for SNP mode.
2. Set the baud rate for 9600 or 19

Figure 4-5 Connecting NT31 to GE Fanuc with CMM Module

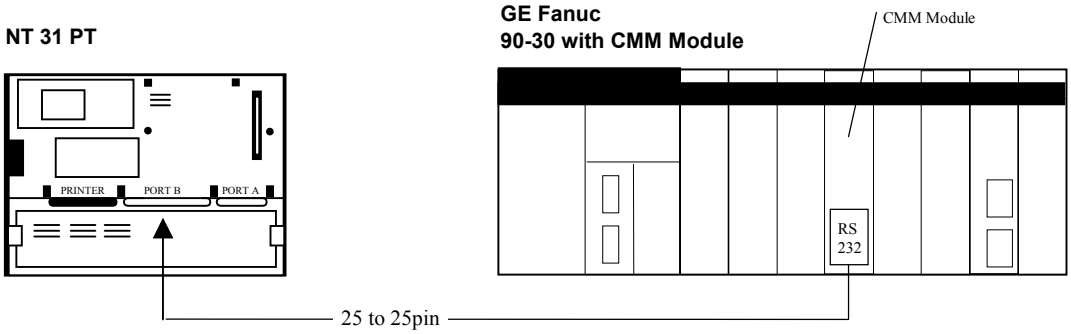
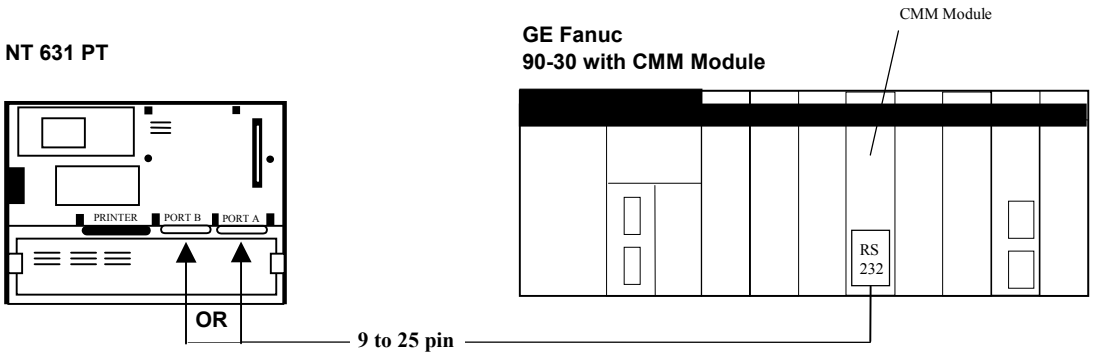


Figure 4-6 Connecting NT631 to GE Fanuc with CMM Module



4-2 Configuring NT31/631 for Communication with GE Fanuc PLCs

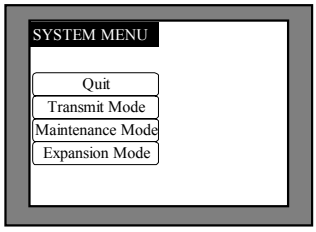
GE Fanuc PLCs communicate to NT31/631 using the SNP protocol. This section describes setting the memory switches on the PT for use with GE Fanuc PLCs. You can configure Port A or Port B on the PT for communications with GE Fanuc PLCs.

■ **To Configure NT31/631 communication for GE Fanuc:**

1. Start the PT.
2. Press two corner keys on the PT at the same time to enter the *System Menu*.

   The *System Menu* screen appears. See Figure 4-7.

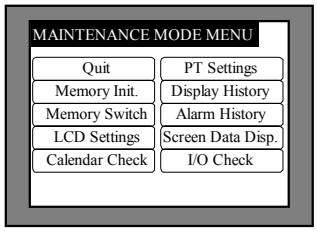
Figure 4-7 System Menu



3. Select *Maintenance Mode*.

   The *Maintenance Mode* menu screen appears. See Figure 4-8.

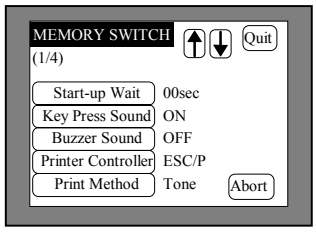
Figure 4-8 Maintenance Mode Menu



4. Select *Memory Switch*.

   The *Memory Switch* screen appears. See Figure 4-9.

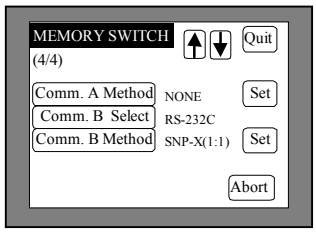
Figure 4-9 Memory Switch screen (1/4)



5. Press the down arrow (next screen) or the up arrow (previous screen) touch switch until the fourth memory switch screen appears.

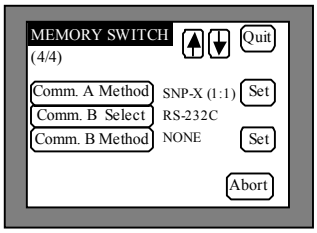
   When you reach the fourth screen, (4/4) displays in the upper left corner of the PT. Port B is the default port for communication between the PT and PLC. SNP-X (1:1) displays to the right of the *Comm. B Method* touch switch. See Figure 4-10. To use port B, skip to step 7.

Figure 4-10 Memory Switch screen (4/4) Comm. B Method



6. To use port A, press the *Comm. A Method* touch switch until SNP-X (1:1) is shown to the right of the touch switch. Press the *Comm. B Method* touch switch until it displays None. See Figure 4-11.

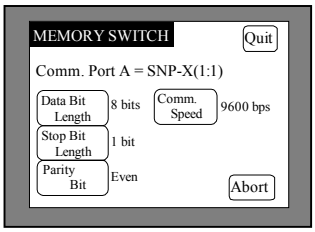
Figure 4-11 Memory Switch screen (4/4) Comm. A Method



7. Press the *Set* touch switch to the right of the selected *Comm. Method* touch switch.

   A screen displays with settings for the selected port. See Figure 4-12.

Figure 4-12 Memory Switch Comm. Port Settings



8. Press the *Comm. Speed* touch switch until the desired communication speed displays.

   The setting option changes each time the touch switch is pressed.

   Note: You may only use 9600 or 19200 for communication between GE Fanuc and NT31/631.

9. Press the *Quit* touch switch twice.

   The *Maintenance Mode Menu* screen displays. The communication port and speed settings are saved.

10. Press the *I/O Check* touch switch, then the *I/F check* touch switch, and then *Comm. Port A* or *Comm. Port B*, to confirm communication between the PT and PLC. Press the *Execute* button. If settings are correct, receive data shows '***'. If settings are incorrect, you will receive an error message.

4-3 Allocation Area Table for GE Fanuc PLCs

GE Fanuc PLC Memory Type	Addressing Identifier
Word Reference	
Register	%R
Analogue Input	%AI
Analogue Output	%AQ
Bit	
Discrete Input	%I
Discrete Output	%Q
Discrete Temporary	%T
Discrete Internal	%M
System Status	%S
System Status A	%SA
System Status B	%SB
System Status C	%SC
Genius Global Data	%G

Note: Full addressing range is covered depending on the PLC.

4-4 GE Fanuc Custom Cable Requirements

Figure 4-13 GE Fanuc to NT31/631 Custom Cable (9 to 9 Pin Connect)

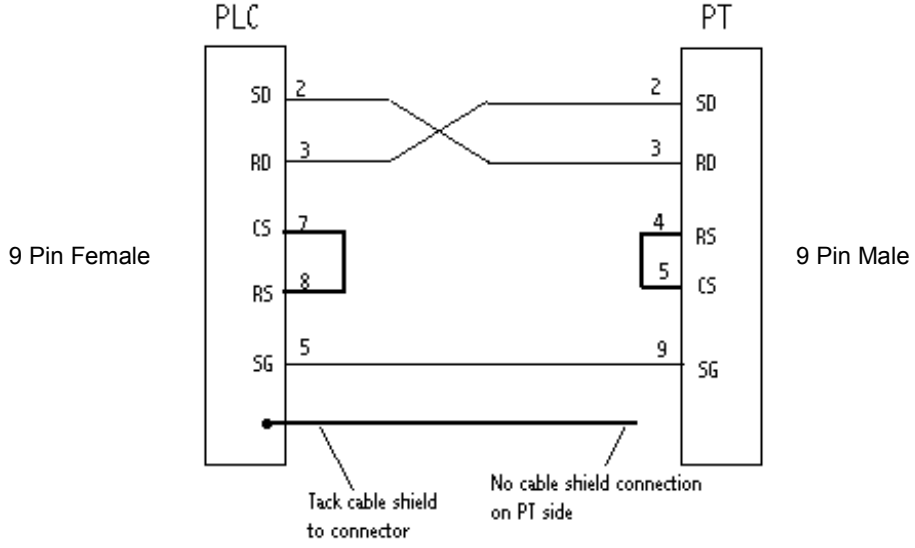
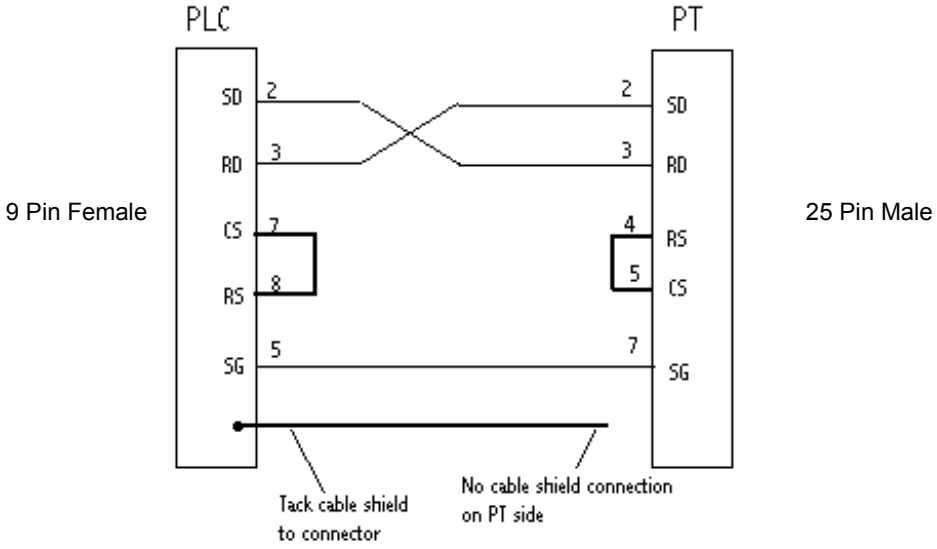


Figure 4-14 GE Fanuc to NT31/631 Custom Cable (9 to 25 Pin Connect)



4-5 GE Fanuc CMM Module Custom Cable Requirements

- Use 25 to 9 pin cable with IC690ACC900 Adapter or CMM Module to connect to NT31/631 9 pin port
- Use 25 to 25 pin cable with IC690ACC900 Adapter or CMM Module to connect to NT31 25 pin port

Figure 4-15 GE Fanuc CMM Module to NT31/631 Custom Cable (25 to 9 Pin Connect)

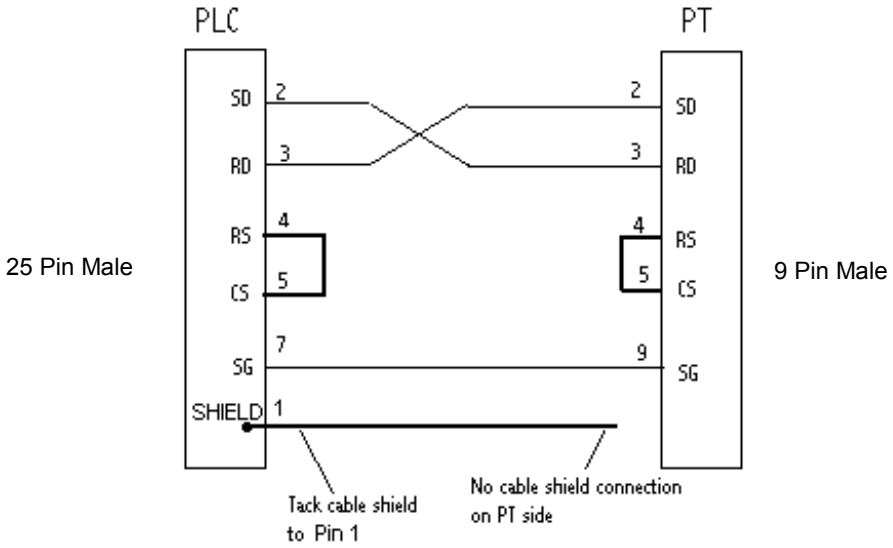
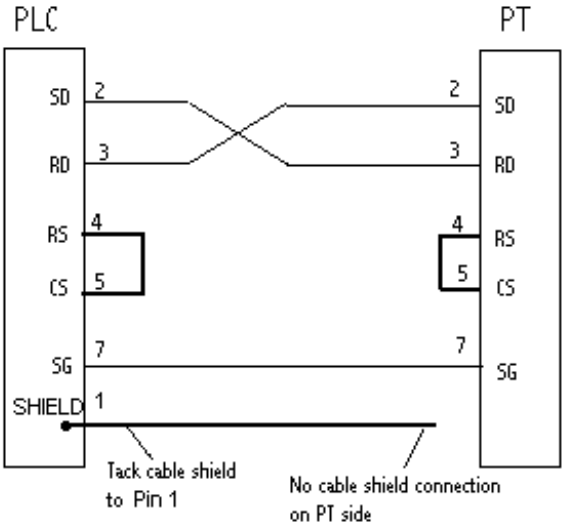


Figure 4-16 GE Fanuc CMM Module to NT31/631 Custom Cable (25 to 25 Pin Connect)



SECTION 5

Use with Siemens PLCs

This section describes specific hardware configuration requirements and equipment necessary to connect NT31/631 to compatible Siemens PLCs.

In This Section

5-1 Configuring NT31/631 for Siemens 46

5-1-1 Connecting NT31/631 to the Siemens S7-300 and S7-400 PLCs.....46

5-2 Configuring NT31/631 for Communication with Siemens PLCs..... 48

5-3 Allocation Area Table for Siemens PLCs 50

5-4 Siemens Custom Cable Requirements..... 50

5-1 Configuring NT31/631 for Siemens

This section describes specific hardware configuration requirements and equipment necessary to connect NT31/631 to compatible Siemens PLCs.

Note: Do not use 9 to 9 pin cable with 9 to 25 pin adapter when connecting the cable to 25 pin port on the PT.

5-1-1 Connecting NT31/631 to the Siemens S7-300 and S7-400 PLCs

To connect the NT31/631 to the Siemens S7-300 and S7-400 PLCs, you need the following equipment:

- S7-300 or S7-400 PLC
- Siemens HMI Adapter
- NT31/631 PT with serial cable to connect PT and HMI adapter (please see Section 5-4 for more information about using the appropriate cable).

■ **To connect NT31 (port B) to Siemens S7-300 or S7-400 with HMI Adapter:**

1. Connect the 25 pin cable to port B of the NT31.
2. Connect the 9 pin end of the cable to the Siemens HMI Adapter
3. Connect the HMI Adapter to the MPI port on the S7-300 or S7-400 PLC.

■ **To connect NT631 (Port A or B) or NT31 to Siemens S7-300 or S7-400 PLC:**

1. Connect the 9 pin cable (male end) to the 9 pin port of the NT31/631 (port B is default).
2. Connect the 9 pin cable (female end) to the Siemens HMI Adapter.
3. Connect the Siemens HMI Adapter to the MPI port on the S7-300 or S7-400 Series PLC.

■ **To configure MPI port on the Siemens:**

- Set MPI port address on Siemens PLC (Default is 2) using Siemens PLC programming software. The MPI port address depends on PLC system. PT memory switch *PLC MPI Address* must match PLC MPI port address.

Figure 5-1 Connecting NT31 to Siemens HMI Adapter with MPI port

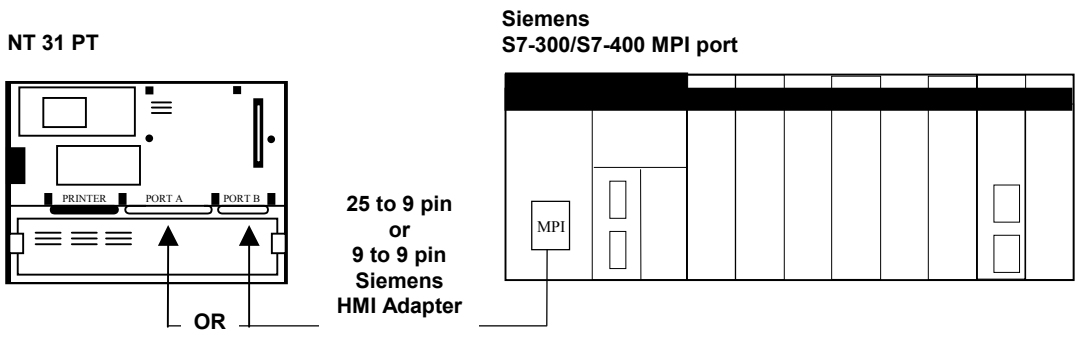
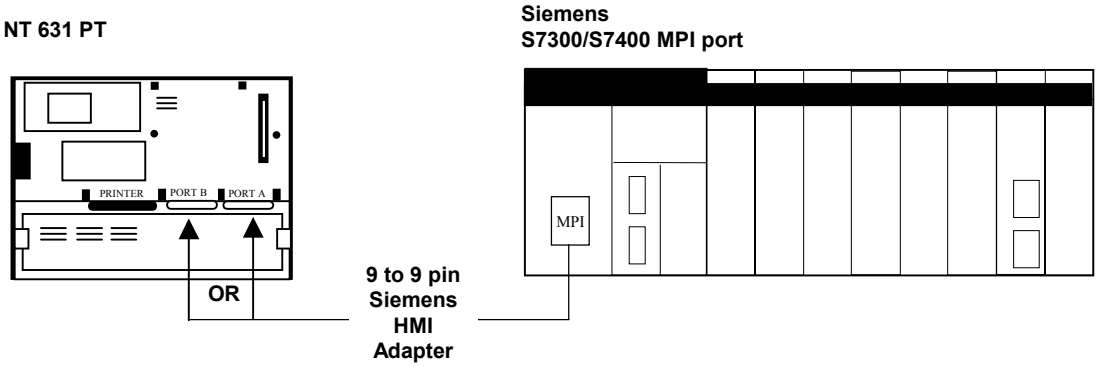


Figure 5-2 Connecting NT631 to Siemens with MPI port



5-2 Configuring NT31/631 for Communication with Siemens PLCs

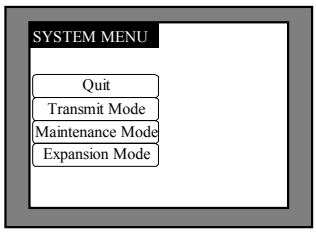
Siemens PLCs communicate to NT31/631 using the Prodave HMI protocol in conjunction with the Siemens HMI adapter. This section describes setting the memory switches on the PT for use with Siemens PLCs. You can configure Port A or Port B on the PT for communications with Siemens PLCs.

■ **To Configure NT31/631 communication for Siemens:**

1. Start the PT.
2. Press two corner keys on the PT at the same time to enter the *System Menu*.

   The *System Menu* screen appears. See Figure 5-3.

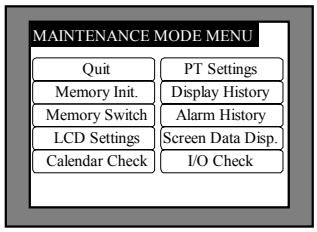
Figure 5-3 System Menu



3. Select *Maintenance Mode*.

   The *Maintenance Mode* menu screen appears. See Figure 5-4.

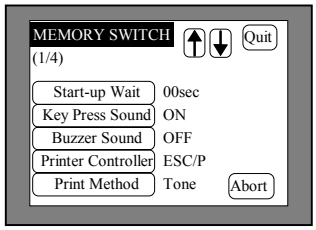
Figure 5-4 Maintenance Mode Menu



4. Select *Memory Switch*.

   The *Memory Switch* screen appears. See Figure 5-5.

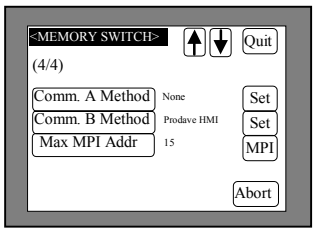
Figure 5-5 Memory Switch screen (1/4)



5. Press the down arrow (next screen) or the up arrow (previous screen) touch switch until the fourth memory switch screen appears.

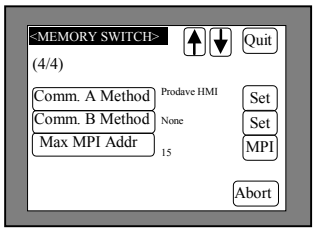
   When you reach the fourth screen, (4/4) displays in the upper left corner of the PT. Port B is the default port for communication between the PT and PLC. Prodave HMI displays to the right of the *Comm. B Method* touch switch. Select Max MPI Address based on the maximum PLC and PT address. Maximum MPI address must be greater than PLC and PT MPI address. See Figure 5-6. To use port B, skip to step 7.

Figure 5-6 Memory Switch screen (4/4) Comm. B Method



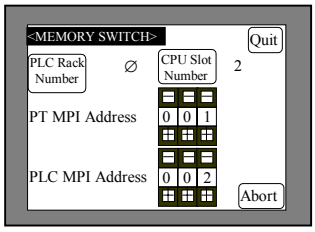
6. To use port A, press the *Comm. A Method* touch switch until Prodave HMI is shown to the right of the touch switch. Press the *Comm. B Method* touch switch until it displays None. Select Max MPI Address based on the maximum PLC and PT address. Maximum MPI address must be greater than PLC and PT MPI address. See Figure 5-7.

Figure 5-7 Memory Switch screen (4/4) Comm. A Method



7. Press the *MPI* touch switch to display the MPI Address screen. See Figure 5-8. The settings for PLC Rack Number, CPU Slot Number, and PLC MPI Address must match the settings of the PLC. The PT MPI Address must be different than the PLC MPI Address.

Figure 5-8 MPI Address screen



8. Press the *Comm. Speed* touch switch until the desired communication speed displays.

   The setting option changes each time the touch switch is pressed.

   Note: You may only use 9600 or 19200 for communication between Siemens and NT31/631.

9. Press the *Quit* touch switch twice.

   The *Maintenance Mode Menu* screen displays. The communication port and speed settings are saved.

10. Press the *I/O Check* touch switch, then the *I/F check* touch switch, and then *Comm. Port A* or *Comm. Port B*, to confirm communication between the PT and PLC. Press the *Execute* button. If settings are correct, receive data shows '***'. If settings are incorrect, you will receive an error message.

5-3 Allocation Area Table for Siemens PLCs

Siemens PLC Memory Type	Bit Addressing Identifier	Bit Addressing Range Limits	Word Addressing Identifier	Word Addressing Rang Limits	Block Number
Input	I	0.0 to 511.7	IW	0 to 510	--
Output	Q	0.0 to 511.7	QW	0 to 510	--
Bit Memory	M	0.0 to 2047.7	MW	0 to 2046	--
Timer	--	--	T	0 to 511	--
Counter	--	--	C	0 to 511	--
Data Block (1 to 4095) (TBR)	DBX	0.0 to 65533.7	DBW	0 to 65532	1 to 4095

5-4 Siemens Custom Cable Requirements

■ **To communicate between PLC and PT (available from Omron unless stated):**

PLC Vendor	PT Model	Connector pin:pin	Length	Omron Part Number
Siemens	NT631 port A, B or NT31 port A	9:9	N/A	See cable diagram (Figure 5-9)
	NT31 port B	25:9	N/A	See cable diagram (Figure 5-10)

Protocol – the interface between NT31/631 and a Siemens PLC is provided by Prodave HMI protocol. This protocol requires use of a Siemens HMI Adapter provided for by Siemens (Siemens Part# 6ES7-972-OCA10-OXAO).

Figure 5-9 Siemens HMI Adapter to Omron PT (9 Pin to 9 Pin Cable)

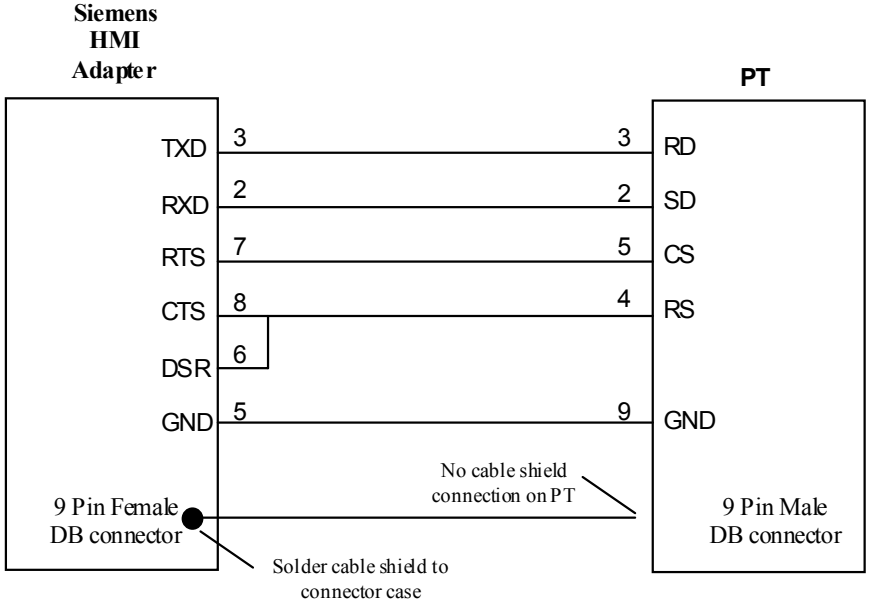
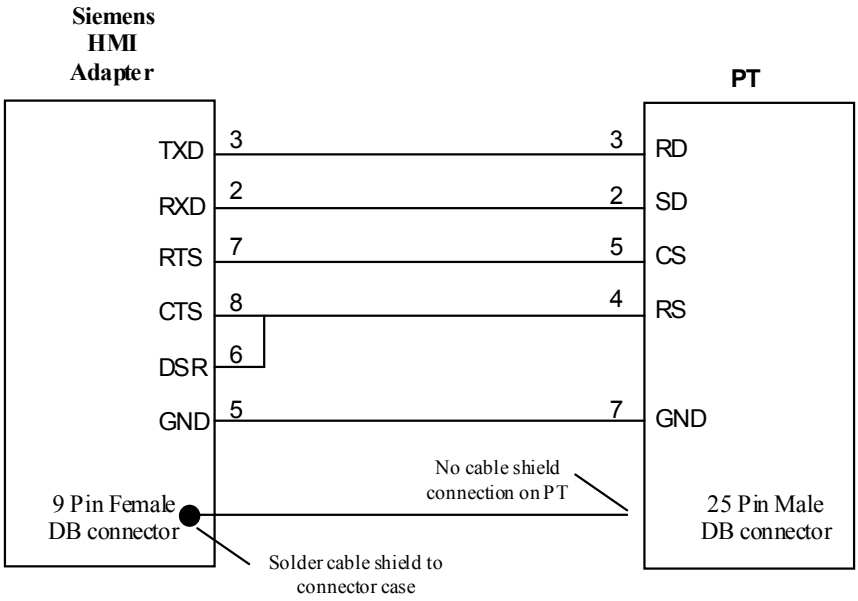


Figure 5-10 Siemens HMI Adapter to Omron PT (9 Pin to 25 Pin Cable)


Siemens
HMI
Adapter
PT
TXD
RXD
RTS
CTS
DSR
GND
3
2
7
8
6
5
3
2
5
4
7
RD
SD
CS
RS
GND
No cable shield
connection on PT
9 Pin Female
DB connector
25 Pin Male
DB connector
Solder cable shield to
connector case

SECTION 6

Use with Modicon PLCs

This section describes specific hardware configuration requirements and equipment necessary to connect NT31/631 to compatible Modicon PLCs.

In This Section

6-1 Configuring NT31/631 for Modicon 54

6-1-1 Connecting NT31/631 to Modicon TSX Micro or Premium PLCs 54

6-1-2 Connecting NT31/631 to Modicon TSX Quantum PLCs 56

6-2 Configuring NT31/631 for Communication with Modicon PLCs 57

6-3 Allocation Area Table for Modicon PLCs 59

6-4 Modicon Custom Cable Requirements 59

6-1 Configuring NT31/631 for Modicon

This section describes specific hardware configuration requirements and equipment necessary for connecting NT31/631 to compatible Modicon TSX Micro, Premium or Quantum PLCs.

Note*:* Do not use 9 to 9 pin cable with 9 to 25 pin adapter when connecting the cable to 25 pin port on the PT.

6-1-1 Connecting NT31/631 to Modicon TSX Micro or Premium

To connect the NT31/631 to the Modicon TSX Micro or Premium you will need the following equipment:

- Modicon TSX Micro (TSX 37-21 or TSX 37-22) or Premium PLC
- Multiprotocol PCMCIA card : TSX SCP 111 for RS 232C or TSX SCP 114 for RS 422A.
- Connecting cable for PCMPIA card : TSX SCP CD 1030 for RS 232C or TSX SCP CM 4030 for RS-422A communication.
- NT31/631 PT with serial cable to connect PT and PLC (please see Section 6-4 for appropriate cable)

■ **To connect NT31 (port B) to Modicon TSX Micro or Premium PLC:**

1. Mount the connecting cable to PCMCIA card.
2. Set the PCMCIA card to PCMCIA slot on TSX Micro or Premium PLC.
3. Connect the 25 pin cable to the 25 pin end of connecting cable with PCMCIA card.
4. Connect the other 25 pin end to port B of NT31.

■ **To connect NT31/631 (port A or B) or NT31 (port A) to Modicon 90-20 or 90-30 with built-in serial port:**

1. Mount the connecting cable to PCMCIA card.
2. Set the PCMCIA card to PCMCIA slot on TSX Micro or Premium PLC.
3. Connect the 25 pin cable to the 25 pin end of the connecting cable with PCMCIA card.
4. Connect the 9 pin cable to the 9 pin port of the NT31/631(port B is default).

■ **To configure PCMCIA card for Modbus:**

1. Configure the link of PCMCIA card for MODBUS/JBUS LINK.
2. Set the type for Slave.
3. Set the transmission speed for 9600 or 19,200.
4. Set the data for RTU(8bit).
5. Set the Stop for 0 or 1.
6. Set the Parity for none, odd or even.

Figure 6-1 Connecting NT31 to Modicon TSX Micro or Premium (RS-232C)

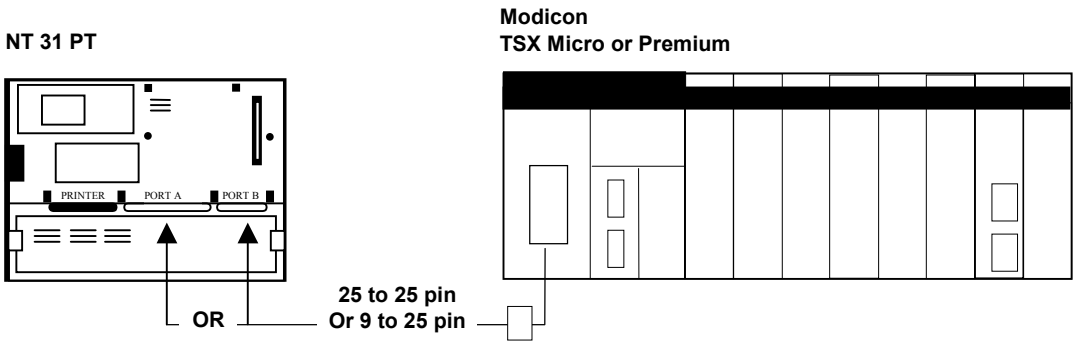


Figure 6-2 Connecting NT631 to Modicon TSX Micro or Premium (RS-232C)

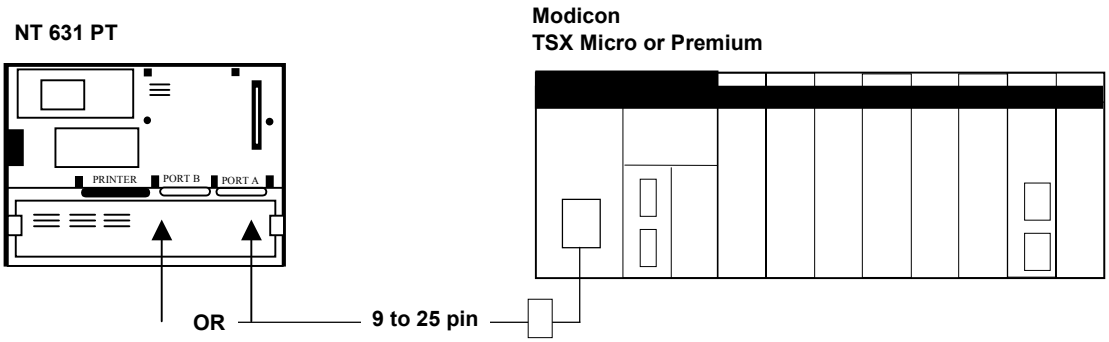


Figure 6-3 Connecting NT31 to Modicon TSX Micro or Premium (RS-422A)

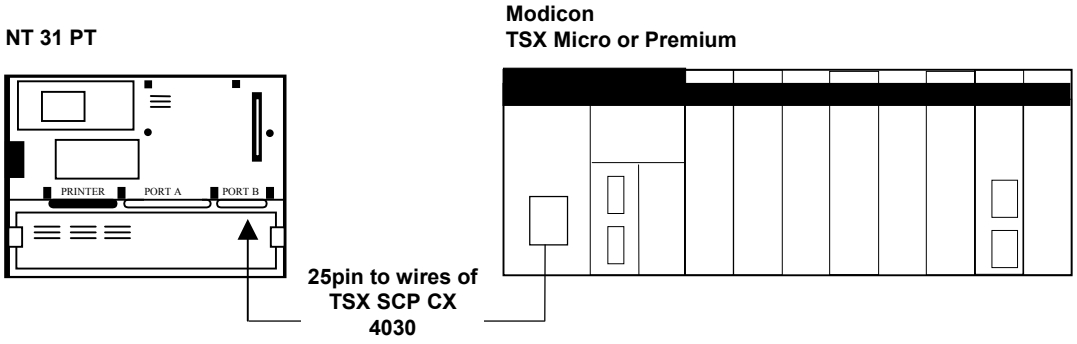
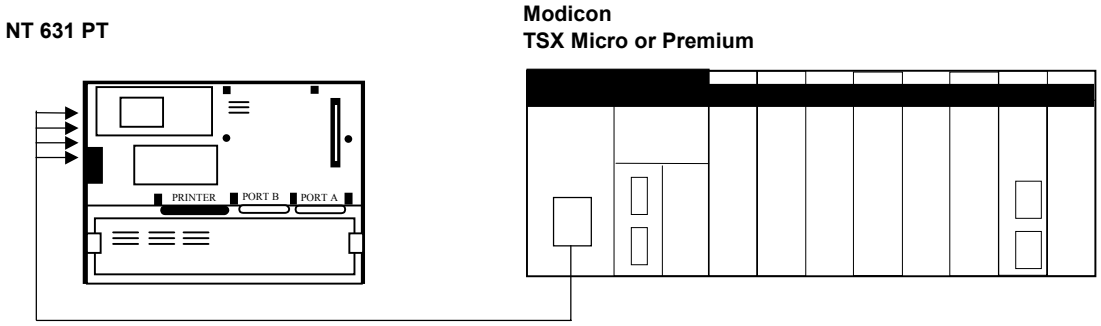


Figure 6-4 Connecting NT631 to Modicon TSX Micro or Premium (RS-422A)



6-1-2 Connecting NT31/631 to Modicon TSX Quantum

To connect the NT31/631 to the Modicon TSX Quantum you will need the following equipment:

- Modicon TSX Quantum PLC
- NT31/631 PT with serial cable to connect PT and PLC (please see Section 6-4 for appropriate cable)

■ **To connect NT31 (port B) to Modicon TSX Quantum:**

1. Connect the 25 pin cable to port B of the NT31.
2. Connect the 9 pin end of the cable to the Modbus port on the TSX Quantum.

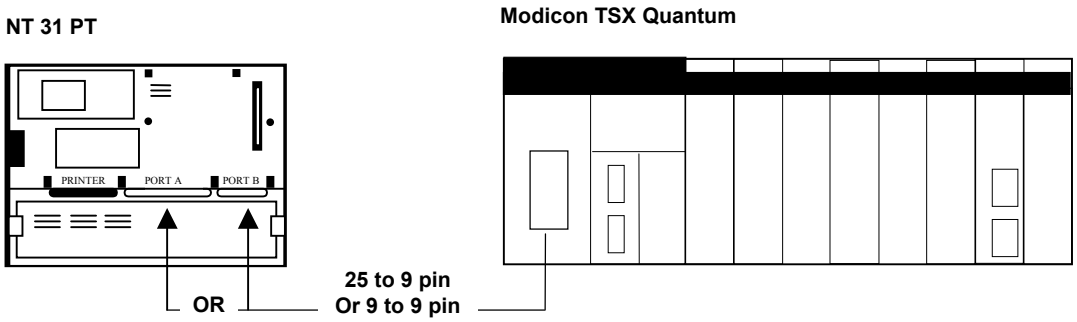
■ **To connect NT631 (port A or B) or NT31 (port A) to Modicon TSX Quantum:**

1. Connect the 9 pin cable to the 9 pin port of the NT31/631 (port B is default).
2. Connect the other 9 pin end of the cable to the Modbus port on the TSX Quantum.

■ **To configure the Modbus port:**

1. Configure Modbus port setting in a support software for TSX Quantum.
2. Set the baud for 9600 or 19,200.
3. Set the mode for RTU.
4. Set the Stop for 0 or 1.
5. Set the Parity for none, odd or even

Figure 6-5 Connecting NT31 to Modicon TSX Quantum



6-2 Configuring NT31/631 for Communication with Modicon PLCs

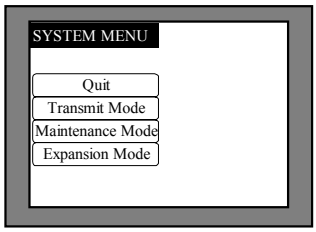
Modicon PLCs communicates to NT31/631 using the Modbus protocol. This section describes setting the memory switches on the PT for use with Modicon PLCs. You can configure Port A or Port B on the PT for communications Modicon PLCs.

■ To Configure NT31/631 communication for Modicon:

1. Start the PT.
2. Press two corner keys on the PT at the same time to enter the *System Menu*.

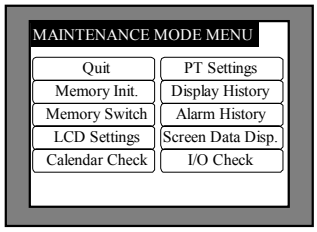
   The *System Menu* screen appears. See Figure 6-6.

Figure 6-6 System Menu



3. The *Maintenance Mode* menu screen appears. See Figure 6-7.

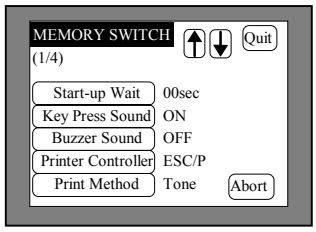
Figure 6-7 Maintenance Mode Menu



4. Select *Memory Switch*.

   The *Memory Switch* screen appears. See Figure 6-8.

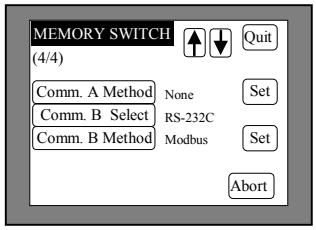
Figure 6-8 Memory Switch screen (1/4)



5. Press the down arrow (next screen) or the up arrow (previous screen) touch switch until the fourth memory switch screen appears.

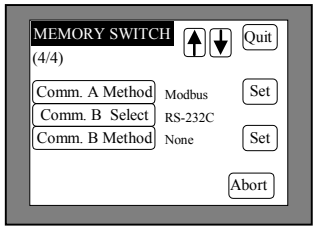
   When you reach the fourth screen, (4/4) displays in the upper left corner of the PT. Port B is the default port for communication between the PT and PLC. Modbus displays to the right of the *Comm. B Method* touch switch. To use port B, skip to step 7.

Figure 6-9 Memory Switch screen (4/4) Comm. B Method



6. To use port A, press the *Comm. A Method* touch switch until Modbus is shown to the right of the touch switch. To use port B, press the *Comm. B Method* touch switch until it displays None. See Figure 6-10.

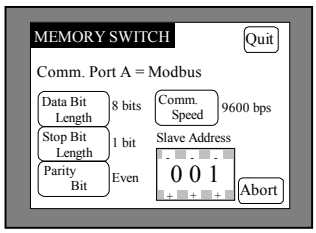
Figure 6-10 Memory Switch screen (4/4) Comm. A Method



7. Press the *Set* touch switch to the right of the selected *Comm. Method* touch switch.

   A screen displays with settings for the selected port. See Figure 6-11.

Figure 6-11 Memory Switch Comm. Port Settings



8. Press the *Comm. Speed* touch switch until the desired communication speed displays.

   The setting option changes each time the touch switch is pressed.

   Note*:* You may only use 9600 or 19200 for communication between Modicon and NT31/631.

9. Press the *Quit* touch switch twice.

   The *Maintenance Mode Menu* screen displays. The communication port and speed settings are saved.

10. Press the *I/O Check* touch switch, then the *I/F check* touch switch, and then *Comm. Port A* or *Comm. Port B*, to confirm communication between the PT and PLC. Press the *Execute* button. If settings are correct, receive data shows '***'. If settings are incorrect, you will receive an error message.

6-3 Allocation Area Table for Modicon PLCs

Modicon PLC Memory Type	Addressing Identifier	Addressing Range Limits
Output/holding bits	0	1 to 9999
Input bits	1	1 to 9999
Input registers	3	1 to 9999
Output/holding register	4	1 to 9999
Extended memory	6	1 to 9999
Internal bit	%M	0 to 9998
Internal word	%MW	0 to 9998

Note: Full addressing range is covered depending on the PLC.

The order of bit numbers that can be specified with NTST and those used at PLC side may differ depending on a PLC. When setting a bit number with NTST, set a number from 0 to 15. The least significant bit is 0 and the most significant bit is 15. For example, when the bit 15 is ON and the other bits are OFF, the value in WORD will be 8000(hex).

Available memory types in Modicon TSX Micro and Premium are %M and %MW.

1. To use %M, select "0:Coil" or "1:inputas" memory type.
2. To use %MW, select "4:Holding Register" as memory type.
3. Add 1 to actual address number in Modicon PLCs for input address number in NTST.

Please refer to the following examples.

Actual Address	Set Address in NTST
%M8	00009
%MW30	40031
%MW40 bit3	40041/3

6-4 Modicon Custom Cable Requirements

Figure 6-12 Modicon to NT31/631 Custom Cable (25 to 9 Pin Connect)

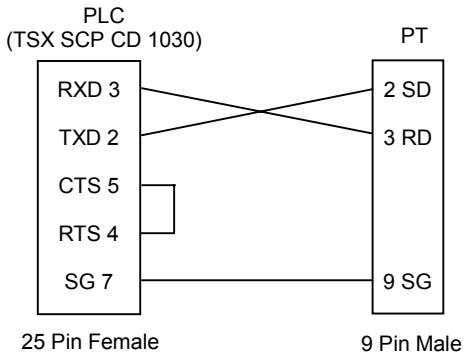


Figure 6-13 Modicon to NT31/631 Custom Cable (25 to 25 Pin Connect)

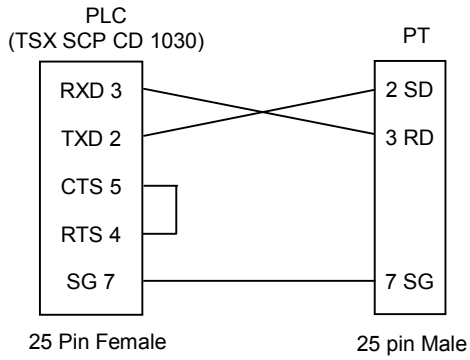


Figure 6-14 Modicon to NT31 Wiring (RS-422A)

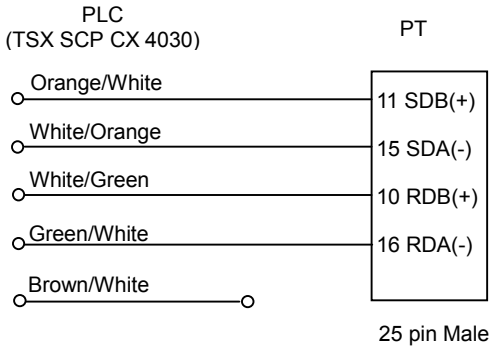
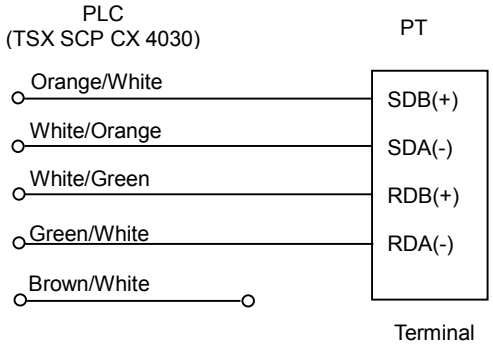


Figure 6-15 Modicon to NT631 Wiring (RS-422A)



APPENDIX A

Error Messages and Troubleshooting

This appendix contains common error messages, provides descriptions of the problem and offers solutions.

In This Section

Error Messages and Troubleshooting 62
Siemens Error Messages and Troubleshooting..... 63
Siemens PLC Error Codes 64
Siemens HMI Adapter Error Codes 65

Error Messages and Troubleshooting

Error Message on PT	Description	Solution
[No Screen Data] No Screen Data is saved in Screen Memory. Download Screen Data using the Support Tool. Then set the PT to Transmit Mode, and download Screen Data again	Screen Data has not been saved in Screen Memory.	Set the PT to Transmit Mode and download Screen Data by using NTST.
[No Direct Connection Info] No Direct Connection Information is set in Screen Data. Set Direct Connection Information in Screen Data by using the Support Tool. Then set PT to Transmit Mode, and download Screen Data again.	There is no Control / Notify area info programmed in Screen Data.	Program Control/Notify area information in Screen Data using NTST. Set the PT to Transmit Mode, and download Screen Data again. Set the Control/Notify Area with appropriate settings. See Section 2-2.
[Incorrect Screen Data] Screen Data in Screen Memory does not match with the System Program. Initialize Screen Memory and download Screen Data again.	The Screen Data in Screen Memory does not match the driver protocol in the PT.	Clear the Screen Memory in the PT using the Memory Initialization button in Maintenance Mode Menu and download Screen Data again.
[No Starting Screen Specified] Starting Screen is not saved. Fix Screen Data using the support tool. Then set the PT to Transmit Mode and download Screen Data again.	The Starting Screen is not defined or is invalid.	Specify initial screen in the PT configuration menu of NTST under the System Tab. After specifying, download Screen Data to PT again.
None. PT Screen is blank, but communicating with PLC.	Value at first word in Control Area possibly set to 0. The PT uses this number to clear the screen. First word of the Control Area in the PLC is not programmed with the appropriate initial screen number.	Reprogram first word of Control Area with the appropriate initial screen number using hand-held programmer or PC-based software.

Siemens Error Messages and Troubleshooting

Error Message on PT	Description	Solution
[Duplicate MPI Addr.]	PT MPI Address and PLC MPI Address are set to the same value.	Change either the PT MPI Address or the PLC MPI Address so that they are not set to the same value.
[Invalid Max. MPI Addr.]	The Max. MPI Address is not larger than the PT MPI Address and/or the PLC MPI Address.	Press the Max. MPI Addr. button to change the Max. MPI Address to a value that is greater than both the PT MPI Address and the PLC MPI Address.
[Error Code: 0x0315]	The PT MPI Address is already used by some other MPI node in the MPI network.	Enter the System Menu Maintenance Mode and press 'Memory Switch'. Move to the 'Memory Switch (4/4)' screen. Press the 'MPI' button. Change the PT MPI Address to a value that is not used anywhere else on the MPI network.
[Error Code: 0x4002] or [Error Code: 0x4004] or [Error Code: 0x8105]	PLC MPI Address, PLC rack number, or CPU slot number is set to an incorrect value.	Use the PLC programming software to determine the PLC MPI Address, PLC rack number, and CPU slot number that is connected to the PT. Enter the System Menu Maintenance Mode and press 'Memory Switch'. Move to the 'Memory Switch (4/4)' screen. Press the 'MPI' button. Change the PLC MPI Address, PLC rack number, and CPU slot number to match the PLC settings.
[Error Code: 0x0101]	HMI Adapter is no longer responding.	Cycle power on HMI adapter by disconnecting from PLC or cycling power on PLC.

Siemens PLC Error Codes

Code	Description
0x0015	Negative acknowledge or invalid/incomplete response
0x0101	Communication link not available
0x010A	Negative acknowledge/time out error
0x010C	Data does not exist or is locked
0x0200	Unknown error
0x0201	Wrong interface specified
0x0202	Too many interfaces
0x0203	Toolbox already initialized
0x0204	Toolbox already initialized with another connection
0x0205	Toolbox not initialized
0x0206	Can't set handle
0x0207	Data segment isn't locked
0x0209	Data field incorrect
0x0302	Block size is too small
0x0303	Block boundary exceeded
0x0313	Wrong MPI-baud rate selected
0x0314	Highest MPI address is wrong
0x0315	MPI address already exists
0x031A	Not connected to MPI network
0x031B	Short circuit at MPI bus
0x0320	Hardware error
0x0381	Hardware error
0x4001	Communication link unknown
0x4002	Communication link not available
0x4003	MPI communication in progress
0x4004	MPI connection down
0x0800	Toolbox is busy
0x8001	Not permitted in this mode
0x8101	Hardware error
0x8103	Access to object not permitted
0x8104	Context not supported
0x8105	Address invalid
0x8106	Data type not supported
0x8107	Data type not consistent
0x8301	Not enough memory on CPU
0x8404	Serious error
0x8500	Wrong PDU size
0xD201	Syntax error: block name
0xD202	Syntax error: function parameter
0xD203	Syntax error: block type
0xD204	No linked data block in CPU
0xD205	Object already exists
0xD206	Object already exists
0xD207	Data block in EPROM
0xD209	Block doesn't exist
0xD20E	No block available
0xD210	Block number too large
0xD241	Protection level too low
0xD406	Information doesn't exist
0xD802	This job does not exist
0xEF01	Wrong ID2, cyclic job handle
0xFFCF	API function called with an invalid parameter
0xFFFF	Time out, check RS-232 interface

Siemens HMI Adapter Error Codes

Code	Description
0xFFDE	Framing error, violation of the asynchronous character frame
0xFFDF	Parity error
0xFFE0	Overrun, too many characters received
0xFFE1	Transportation errors (e.g. parity)
0xFFE2	Telegram didn't receive any acknowledge
0xFFE3	Collision with a remote partner of higher priority
0xFFE4	Device in receiving mode
0xFFE5	Number of max, connection requests exceeded
0xFFE6	Function not supported in the current mode
0xFFE7	Mode not supported
0xFFE8	Port handle not valid
0xFFE9	Hardware does not support this function
0xFFEA	Port table full
0xFFEB	Timeout during write operation
0xFFEC	Value out of range
0xFFED	Port not open
0xFFEE	Can't allocate buffer
0xFFEF	Device not installed
0xFFF0	Device already open
0xFFFD	Unknown function
0xFFFE	Unknown error

APPENDIX B

Address Conversion Table

This appendix contains Address Conversion table.

In This Section

Address Conversion Table 68

Address Conversion Table

Address conversion will be available when converting between 2 different vendor types. In order to simplify the conversion rules, the common code table method will be used.

In this table, each address type of a particular vendor is assigned a code. During conversion of vendor, the address type of the source vendor will be converted to the address type having the same code in the target vendor. If there is no code available for an address type in the target vendor, the address will be reset to NULL, i.e. no address

If the target vendor type does not have the address range which source vendor supports, all of the addresses which exceed the target range will be reset to NULL.

	Omron	Mitsubishi A	Mitsubishi Fx	AB	GE	Memory Link	Siemens	Modicon
1	DM [0-32767]	D [0-9999]	D [0-9999]	N [7,10-255] [0-255]	R [1-9999]	*	*	4: Holding Register [1-9999]
2	CH [0-32767]	M [0-9999]	M [0-9999]	B [3,10-255] [0-255]	M [1-9999]	CH [0-9999]	M [0-255]	*
3	TIM [0-32767]	T [0-9999]	T [0-9999]	T[1] [4,10-255] [0-255]	*	*	T [0-127]	*
4	CNT [0-32767]	C [0-9999]	C [0-9999]	C[1] [5,10-255] [0-255]	*	*	C [0-63]	*
5	HR [0-32767]	L [0-9999]	*	I [1] [0-30]	T [1-9999]	*	*	*
6	AR [0-32767]	*	S [0-9999]	O [0] [0-30]	*	*	*	*
7	LR [0-32767]	B(16) [0-270F]	*	S [2] [0-255]	G [1-9999]	*	*	*
8	W [0-32767]	W(16) [0-270F]	*	*	*	*	*	*
9	*	X(16) [0-270F]	X(8) [0-23417]	*	I [1-9999]	*	I/PIW [0-127]	1: Input [1-9999]
10	*	Y(16) [0-270F]	Y(8) [0-23417]	*	Q [1-9999]	*	Q/PQW [0-127]	0: Coil [1-9999]
11	EM[3] [0-32767]	R [0-9999]	*	R[1] [6,10-255] [0-255]	S [1-9999]	*	*	*
12	*	*	*	T[2] [4,10-255] [0-255]	SA [1-9999]	*	*	*
13	*	*	*	C[2] [5,10-255] [0-255]	SB [1-9999]	*	*	*

	Omron	Mitsubishi A	Mitsubishi Fx	AB	GE	Memory Link	Siemens	Modicon
14	*	*	*	R^2 [6,10-255] [0-255]	SC [1-9999]	*	*	*
15	*	*	*	*	AI [1-9999]	*	*	3: Input Register [1-9999]
16	*	*	*	*	AQ [1-9999]	*	*	*
17	TK [0-32767]	*	*	*	*	*	*	*
18	EM0 [0-32767]	*	*	*	*	*	DB0 [0-65533]	6: Extend Memory File 1 [1-9999]
19	EM1 [0-32767]	*	*	*	*	*	DB1 [0-65533]	6: Extend Memory File 2 [1-9999]
20	EM2 [0-32767]	*	*	*	*	*	DB2 [0-65533]	6: Extend Memory File 3 [1-9999]
21	EM3 [0-32767]	*	*	*	*	*	DB3 [0-65533]	6: Extended Memory File 4 [1-9999]
22	EM4 [0-32767]	*	*	*	*	*	DB4 [0-65533]	6: Extended Memory File 5 [1-9999]
23	EM5 [0-32767]	*	*	*	*	*	DB5 [0-65533]	6: Extended Memory File 6 [1-9999]
24	EM6 [0-32767]	*	*	*	*	*	DB6 [0-65533]	6: Extended Memory File 7 [1-9999]
25	EM7 [0-32767]	*	*	*	*	*	DB7 [0-65533]	6: Extended Memory File 8 [1-9999]
26	EM8 [0-32767]	*	*	*	*	*	DB8 [0-65533]	6: Extended Memory File 9 [1-9999]

Address Conversion Table

	Omron	Mitsubishi A	Mitsubishi Fx	AB	GE	Memory Link	Siemens	Modicon
27	EM9 [0-32767]	*	*	*	*	*	DB9 [0-65533]	6: Extended Memory File 10 [1-9999]
28	EMA [0-32767]	*	*	*	*	*	DB10 [0-65533]	*
29	EMB [0-32767]	*	*	*	*	*	DB11 [0-65533]	*
30	EMC [0-32767]	*	*	*	*	*	DB12 [0-65533]	*
31	TU [0-32767]	*	*	*	*	*	*	*
32	CU [0-32767]	*	*	*	*	*	*	*

[1] PRE value
[2] ACC value
[3] Current Bank
[4] n is from 1-4095. There is no conversion for Data Block.

(16) – hexadecimal
(8) – octal
Shade – Word or byte address
Non-shade – Bit address

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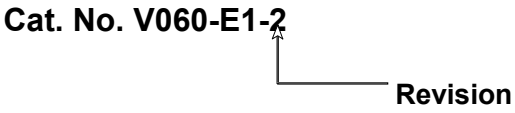
Revision History

A manual revision code appears as a suffix to the catalog number on the front cover of the manual.



The following table outlines the changes made to the manual during each revision. Page numbers refer to the previous version.

Revision code	Date	Revised content
1	November 1999	Original production
2	January 2001	Descriptions for the following products added. Modicon PLCs, Allen-Bradley PLC5, Allen-Bradley MicroLogix 1000, 1200, and 1500

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